

# Giraffe™ OmniBed™

Carestation™

CS1

Service Manual



2077955-001 Revision L  
Class A

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# Revision History

Revision	Revision Date	Revision Description
L	June 2017	Updated Service language disclaimer, part numbers, part descriptions, diagrams, procedure steps, specifications, and front and back covers.
K	June 2016	Implemented Low Noise Fan updates.
J	November 2015	Implemented Service Process Validation changes.
H	September 2015	Initial release.



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# Service Language Disclaimer



(EN)

## **WARNING:**

This service manual is available in English only.

- If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services.
- Do not attempt to service the equipment unless this service manual has been consulted and is understood.
- Failure to heed this warning may result in injury to the service provider, operator, or patient from electric shock, mechanical hazards, or other hazards.



(BG)

## **ПРЕДУПРЕЖДЕНИЕ**

Това упътване за работа е налично само на английски език.

- Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод.
- Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа.
- Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациента в резултат на токов удар, механична или друга опасност.



(ZH-CN)

## **警告**

本维修手册仅提供英文版本。

- 如果客户的维修服务人员需要非英文版本，则客户需自行提供翻译服务。
- 未详细阅读和完全理解本维修手册之前，不得进行维修。
- 忽略本警告可能对维修服务人员、操作人员或患者造成电击、机械伤害或其他形式的伤害。



(ZH-HK)

## **警告**

本服務手冊僅提供英文版本。

- 倘若客戶的服務供應商需要英文以外之服務手冊，客戶有責任提供翻譯服務。
- 除非已參閱本服務手冊及明白其內容，否則切勿嘗試維修設備。
- 不遵從本警告或會令服務供應商、網絡供應商或病人受到觸電、機械性或其他危險。



(ZH-TW)

## **警告**

本維修手冊僅有英文版。

- 若客戶的維修廠商需要英文版以外的語言，應由客戶自行提供翻譯服務。
- 請勿試圖維修本設備，除非您已查閱並瞭解本維修手冊。
- 若未留意本警告，可能導致維修廠商、操作員或病患因觸電、機械或其他危險而受傷。



(HR)

### **UPOZORENJE**

Ovaj servisni priručnik dostupan je na engleskom jeziku.

- Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod.
  - Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik.
  - Zanimarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.
- 



(CS)

### **VÝSTRAHA**

Tento provozní návod existuje pouze v anglickém jazyce.

- V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka.
  - Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah.
  - V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.
- 



(DA)

### **ADVARSEL**

Denne servicemanual findes kun på engelsk.

- Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse.
  - Forsøg ikke at servicere udstyret uden at læse og forstå denne servicemanual.
  - Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.
- 



(NL)

### **WAARSCHUWING**

Deze onderhoudshandleiding is enkel in het Engels verkrijgbaar.

- Als het onderhoudspersoneel een andere taal vereist, dan is de klant verantwoordelijk voor de vertaling ervan.
  - Probeer de apparatuur niet te onderhouden alvorens deze onderhoudshandleiding werd geraadpleegd en begrepen is.
  - Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de operator of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.
- 



(ET)

### **HOIATUS**

See teenindusjuhend on saadaval ainult inglise keeles

- Kui klienditeeniduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest.
  - Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist.
  - Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.
-



(FI)

**VAROITUS**

Tämä huolto-ohje on saatavilla vain englanniksi.

- Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla.
- Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen.
- Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.



(FR)

**ATTENTION**

Ce manuel d'installation et de maintenance est disponible uniquement en anglais.

- Si le technicien d'un client a besoin de ce manuel dans une langue autre que l'anglais, il incombe au client de le faire traduire.
- Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance n'a pas été consulté et compris.
- Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.



(DE)

**WARNUNG**

Diese Serviceanleitung existiert nur in englischer Sprache.

- Falls ein fremder Kundendienst eine andere Sprache benötigt, ist es Aufgabe des Kunden für eine entsprechende Übersetzung zu sorgen.
- Versuchen Sie nicht diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben.
- Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendiensttechnikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.



(EL)

**ΠΡΟΕΙΔΟΠΟΙΗΣΗ**

Το παρόν εγχειρίδιο σέρβις διατίθεται μόνο στα αγγλικά.

- Εάν ο τεχνικός σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει τις υπηρεσίες μετάφρασης.
- Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό αν δεν έχετε συμβουλευτεί και κατανοήσει το παρόν εγχειρίδιο σέρβις.
- Αν δεν προσέξετε την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στον τεχνικό σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.



(HU)

**FIGYELMEZTETÉS**

Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el.

- Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészítése.
- Ne próbálja elkezdni használni a berendezést, amíg a karbantartási kézikönyvben leírtakat nem értelmezték.
- Ezen figyelmeztetés figyelmen kívül hagyása a szolgáltató, működtető vagy a beteg áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.



(IS)

### **AÐVÖRUN**

Þessi þjónustuhandbók er aðeins fáanleg á ensku.

- Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálþjónustu.
- Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin.
- Brot á sinna þessari aðvörungun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.



(IT)

### **AVVERTENZA**

Il presente manuale di manutenzione è disponibile soltanto in lingua inglese.

- Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione.
- Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto.
- Il mancato rispetto della presente avvertenza potrebbe causare lesioni all'addetto alla manutenzione, all'operatore o ai pazienti provocate da scosse elettriche, urti meccanici o altri rischi.



(JA)

### **警告：**

このサービスマニュアルには英語版しかありません。

- サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
- このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないでください。
- この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。



(KO)

### **경고**

본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다 .

- 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우 , 번역 서비스를 제공하는 것은 고객의 책임입니다 .
- 본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오 .
- 본 경고 사항에 유의하지 않으면 전기 쇼크 , 기계적 위험 , 또는 기타 위험으로 인해 서비스 제공자 , 사용자 또는 환자에게 부상을 입힐 수 있습니다 .



(LV)

### **BRĪDINĀJUMS**

Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā.

- Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu.
- Neveiciet aprīkojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas.
- Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas triecienu, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.



(LT)

**ISPĖJIMAS**

Šis eksploataavimo vadovas yra tik anglų kalba.

- Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas.
- Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploataavimo vadovo.
- Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.



(NO)

**ADVARSEL**

Denne servicehåndboken finnes bare på engelsk.

- Hvis kundens serviceleverandør har bruk for et annet språk, er det kundens ansvar å sørge for oversettelse.
- Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått.
- Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.



(PL)

**OSTRZEŻENIE**

Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.

- Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta.
- Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go.
- Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.

(PT-  
BR)**AVISO**

Este manual de assistência técnica encontra-se disponível unicamente em inglês.

- Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução.
- Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.
- A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.

(PT-  
PT)**ATENÇÃO**

Este manual de assistência técnica só se encontra disponível em inglês.

- Se qualquer outro serviço de assistência técnica solicitar este manual noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução.
- Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.
- O não cumprimento deste aviso pode colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques elétricos, mecânicos ou outros.



### **ATENȚIE**

(RO)

Acest manual de service este disponibil doar în limba engleză.

- Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere.
  - Nu încercați să reparați echipamentul decât ulterior consultării și înțelegerii acestui manual de service.
  - Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.
- 



### **ОСТОРОЖНО!**

(RU)

Данное руководство по техническому обслуживанию представлено только на английском языке.

- Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод.
  - Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения.
  - Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение.
- 



### **UPOZORENJE**

(SR)

Ovo servisno uputstvo je dostupno samo na engleskom jeziku.

- Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge.
  - Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo.
  - Zanemarivanje ovog upozorenja može dovesti do povređivanja servisera, rukovaoca ili pacijenta usled strujnog udara ili mehaničkih i drugih opasnosti.
- 



### **UPOZORNENIE**

(SK)

Tento návod na obsluhu je k dispozícii len v angličtine.

- Ak zákazníkovi poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka.
  - Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obsluhu a neporozumiete mu.
  - Zanedbanie tohto upozornenia môže spôsobiť zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.
- 



### **ATENCIÓN**

(ES)

Este manual de servicio sólo existe en inglés.

- Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual.
  - No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio.
  - La no observancia del presente aviso puede dar lugar a que el proveedor de servicios, el operador o el paciente sufran lesiones provocadas por causas eléctricas, mecánicas o de otra naturaleza..
-



(SV)

**VARNING**

Den här servicehandboken finns bara tillgänglig på engelska.

- Om en kunds servicetekniker har behov av ett annat språk än engelska, ansvarar kunden för att tillhandahålla översättningstjänster.
- Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken.
- Om du inte tar hänsyn till den här varningen kan det resultera i skador på serviceteknikern, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.



(SL)

**OPOZORILO**

Ta servisni priročnik je na voljo samo v angleškem jeziku.

- Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod.
- Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli.
- Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.



(TR)

**DİKKAT**

Bu servis kılavuzunun sadece ingilizcesi mevcuttur.

- Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer.
- Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz.
- Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.



(KK)

**ЕСКЕРТУ**

Осы қызмет көрсету нұсқаулығы тек ағылшын тілінде қолжетімді.

- Егер тұтынушылардың қызметтер жеткізушісі ағылшын тілінен басқа тілді талап етсе, аудару қызметтерімен қамтамасыз ету тұтынушының жауапкершілігіне кіреді.
- Осы қызмет көрсету нұсқаулығын түсініп, ол туралы кеңес алмайынша жабдыққа қызмет көрсетуге тырыспаңыз.
- Осы ескертуді орындамау электр тогының соғуы, механикалық немесе басқа да қауіптер салдарынан қызметтер жеткізушісінің, оператордың немесе емделушінің жарақаттануына алып келуі мүмкін.



(VI)

**CẢNH BÁO**

Hướng dẫn sử dụng dịch vụ này chỉ sẵn dùng bằng tiếng Anh.

- Nếu nhà cung cấp dịch vụ của khách hàng yêu cầu ngôn ngữ khác ngoài tiếng Anh, thì khách hàng phải có trách nhiệm cung cấp các dịch vụ dịch thuật.
- Không được tìm cách sửa chữa thiết bị trừ khi đã tham khảo và hiểu rõ Hướng dẫn sử dụng dịch vụ này.
- Bỏ qua lời cảnh báo này có thể gây thương tích cho nhà cung cấp dịch vụ, nhân viên vận hành hoặc bệnh nhân do sốc điện, những nguy hiểm về máy móc hoặc yếu tố khác.





# Safety and Regulatory Information

## Warnings



**Warning:** Before using the device, read through this entire manual. Attempting to use this device without a thorough understanding of its operation may result in patient and user injury.

---



**Warning:** This device should only be operated by clinically trained personnel familiar with the risks and benefits of this type of device.

---



**Warning:** Use of this device is restricted to one patient at a time.

---



**Warning:** Complete the service checkout procedure section of this manual before putting the device into operation. If the equipment fails any portion of the checkout procedure it must be removed from use and repaired.

---



**Warning:** Do not perform the service checkout procedure while the patient occupies the device.

---



**Warning:** Do not use the device in the presence of flammable anesthetics; an explosion hazard exists under these conditions.

---



**Warning:** Do not place the device in extreme environmental conditions such as a high ambient air flow environment or high or low temperature. This may affect the thermal balance of the patient.

---



**Warning:** Do not use this device if the system failure alarm is activated. Remove the device from service and contact authorized service personnel for repair.

---



**Warning:** In the event of loss of mains power, check all parameters upon power restoration.

---



**Warning:** Carefully route patient cabling to reduce the possibility of patient entanglement or strangulation.

---



**Warning:** Do not lean against the side of the device. The pressure may cause the device to tip over.

---



**Warning:** Do not connect to a power strip or another unapproved piece of equipment. This may result in power failure or a reduced level of safety.

---



**Warning:** Do not connect unapproved equipment into the accessory outlets.

---

Warnings



**Warning:** Use the device only with the power cord supplied.



**Warning:** The use of accessories, replacement parts, or power cords other than those specified by the manufacturer may affect the performance of the device and could result in damage to the device or unsafe operating conditions.



**Warning:** To avoid the risk of electrical shock, this equipment must directly connect to a supply mains with a grounded outlet or a hospital grade outlet.



**Warning:** Cover patients' eyes if an observation light is used for an extended time. Prolonged exposure to an observation light can damage patient's eyes.



**Warning:** Insulation on electrical wiring can deteriorate with age. Check for brittle or deteriorated insulation on power cord and all other electrical wiring.



**Warning:** Do not clean or disinfect while the device is in clinical use.



**Warning:** Always wear gloves while cleaning and disinfecting the device.



**Warning:** Do not service the device while it is in clinical use.



**Warning:** Always disconnect power prior to performing service or maintenance.



**Warning:** This device should only be serviced by authorized service personnel.



**Warning:** Allow the device to dry after cleaning and disinfection. Small amounts of flammable agents, such as glycol, ether, alcohol, or similar cleaning or disinfecting solvents left wet on the device can ignite.



**Warning:** Dispose of all waste properly as per federal, state, and local waste disposal regulations. Improper disposal could result in personal injury and environmental impact.



**Warning:** Using a device with a fan motor that has worn parts can produce unacceptable noise levels within the patient compartment.



**Warning:** Limit the load on the device on the outside of each upright to 18kg. Do not mount shelves to the outside mounting rail more than 137 cm from the floor.



**Warning:** Overloading the shelves and rails can affect the stability of the device. Always try to evenly distribute the weight of options on both sides of the unit for a more balanced load.



**Warning:** Direct sunlight, phototherapy, other radiant heat sources, or heated mattresses can cause an increase in device and patient temperature.



**Warning:** Proper temperature control depends on continuous, unobstructed air circulation. Do not cover air circulation openings around the bed, as obstruction will result in loss of air circulation, loss of heat, and carbon dioxide buildup.



**Warning:** A hazard can exist if different alarm settings are used with the same or similar equipment on a single patient.



**Warning:** Do not raise the incubator hood while the patient occupies the device. Raise the hood only for hood disassembly or cleaning.



**Warning:** When bed panels are in an upright position, ensure that the bed panels are securely locked in place. Ensure all bed panels are secure prior to leaving the patient's bedside.



**Warning:** When opening or closing bed panels or portholes, make sure that the patient, as well as, clothing, monitoring leads, tubing, and similar items are completely within the confines of the bed. Inspect all patient connected tubes or leads before and after sliding out, rotating, tilting, or raising and lowering the bed. Moving the bed can pull on leads and tubing, restrict gas or liquid flow, or move probes out of position.



**Warning:** When using a chest tube drainage system, verify that the system has adequate floor clearance prior to transporting or activating the elevating base.



**Warning:** Always set the brakes before placing a patient in the device.



**Warning:** Do not leave the patient unattended while any bed panels are lowered or removed.



**Warning:** Only use bed panels approved for this device.



**Warning:** Do not leave the patient unattended when using the device.



**Warning:** Before raising or lowering the bed, check that there is adequate slack in tubing and leads and that no obstructions limit the range of motion.



**Warning:** Never place patient on the X-ray tray. The X-ray tray is located under the mattress.



**Warning:** Do not transport with storage drawer(s) open.



**Warning:** Tilting the mattress from its horizontal position can result in uneven heat distribution.

### Warnings



**Warning:** Use of electrosurgical units or other electrical field radiating equipment can affect the operation of the device. Keep the patient probe lead as far away as possible from electrosurgical cables. Do not allow excess electrical cables to be laid on the bed platform. Use of electrosurgical units or other instruments that radiate electrical fields can cause indirect heating, by several tenths of a degree of the skin temperature probe due to absorbed electrical energy. When using these devices near the radiant warmer, operate the device in Manual Mode for maximum safety and use a skin temperature probe to monitor patient temperature. For added safety, you should consider use of the skin temperature alarm found in the Setup menu.

---



**Warning:** Radiant warmers may increase a patient's insensible water loss. Take appropriate measures to maintain the patient's fluid balance while caring for them on a radiant warmer.

---



**Warning:** Radiant energy can adversely affect blood components. When using intravenous tubing systems for delivery of blood components to patients occupying a device, limit the volume of a single transfusion to a quantity that can be infused within four hours or per clinical protocol.

---



**Warning:** Radiant energy may cause more rapid urine evaporation, and may lead to inaccurate urine diagnostic test analysis and inaccurate diaper weight measurements. Frequent measurement of urinary output is recommended.

---



**Warning:** Use Baby Mode unless Manual Mode is specifically prescribed. Always monitor the patient with the skin temperature probe and an independent thermometer device.

---



**Warning:** Do not place objects in the radiant heat path. Objects will be heated and could block heat to the patient.

---



**Warning:** Do not place patient under radiant heat during Warmup Mode. Warmup mode is used to quickly warm and maintain heat in an empty bed. Warmup mode is not designed for clinical use with a patient due to the fact that the Check Baby Alarm is disabled.

---



**Warning:** The heater, lamps, and surrounding areas are hot when in use and for 30 minutes after power down.

---



**Warning:** Do not use a mercury thermometer while device is in use.

---



**Warning:** Do not place the patient in the bed during Warmup mode.

---



**Warning:** Once the patient is admitted, do not keep the device in Manual mode at 100% power for extended periods of time.

---



**Warning:** Observe the patient frequently, looking for signs of heat stress such as skin redness, warmth to touch, diaphoresis, or increased heart rate.

---



**Warning:** Check the patient's temperature frequently with an independent temperature measurement at a site such as the axilla, rectum, or ear.



**Warning:** Only use GE approved skin temperature probes; other manufacturers' probes are not calibrated to GE equipment. Using probes from other manufacturers' may cause inaccurate temperature readings, may not comply with safety standards, and will void your GE equipment warranty.



**Warning:** When using phototherapy lamps, the skin temperature probe must be directly in the path of the radiant heat of the lamp; do not place the probe in an area shielded from the radiant heat.



**Warning:** Do not re-use a disposable skin temperature probe. Cleaning and reusing a single use skin temperature probe may damage the skin temperature probe and result in inaccurate readings.



**Warning:** Do not place the skin temperature probe between the patient and the mattress; inaccurate readings will result.



**Warning:** Do not remove the reflective foil from the heat reflecting patch. Do not use a skin temperature probe without a heat reflecting patch. Replace the heat reflecting patch when repositioning the skin temperature probe or when adhesive strength degrades.



**Warning:** Do not pull on the skin temperature probe wire. Remove the skin temperature probe from the skin by gently lifting the adhesive patch. Remove the skin temperature probe from the probe panel by grasping the plug and pulling out.



**Warning:** Regularly check that the skin temperature probe is attached to the patient's skin. If the skin temperature probe is not in contact with the patient's skin, inaccurate readings will result.



**Warning:** Do not use skin temperature probe as rectal temperature probe to control the patient's temperature.



**Warning:** The skin temperature probe is not isolated from earth ground. Any additional equipment used with the device must comply with IEC 60601.



**Warning:** Single patient use and single use devices are not designed or validated to be reused between patients. Reuse may cause a risk of cross-contamination.



**Warning:** The clinician must ensure that the single patient use device is not damaged or contaminated between usages on the same patient.



**Warning:** When performing ECMO (Extracorporeal Membrane Oxygenation) or HFOV (High Frequency Oscillatory Ventilation), disable the Elevating Base using the Setup screen. Patient injury may result if the elevating base is moved unintentionally.

### Warnings



**Warning:** Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the User Manual.

---



**Warning:** Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the device, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

---



**Warning:** This equipment/system is intended for use by clinically trained professionals only. It may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the equipment system or shielding the location. Verify equipment adjacent to the device operates as intended.

---



**Warning:** This device does not incorporate an alternative power source. The device must be connected to an alternate power source when loss of power would result in an unacceptable risk.

---



**Warning:** The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

---



**Warning:** When adjusting the Alarm Volume make certain the alarm volume is greater than the ambient sound level. When the alarm volume is set below the ambient sound levels the alarm may not be audible.

---



**Warning:** A hazard may exist if the alarm presets are different for equipment used in a single area.

---



**Warning:** Allow the humidifier heat cylinder to cool about ten minutes before removing the water reservoir.

---



**Warning:** Always use sterile distilled or distilled water to fill the water reservoir. Other types of water can cause damage to the humidifier.

---



**Warning:** Install the water reservoir on all devices equipped for a humidifier, even if you do not plan to use the humidifier.

---



**Warning:** Disconnect any oxygen supply to the device when using the electrosurgical unit to avoid risk of fire.

---



**Warning:** To administer free flow oxygen within the patient compartment, use only a servo-controlled oxygen delivery system. If a servo-controlled oxygen system is not used, variations in fan speed may cause unexpected changes in O<sub>2</sub> levels. Additional oxygen should only be administered under the direction of qualified medical personnel.

---



**Warning:** If oxygen is administered outside of the device's oxygen system, use an oxygen analyzer to monitor oxygen levels.

---



**Warning:** The use of head boxes, oxygen hoods, and oxygen administration can increase the noise level inside the device.

---



**Warning:** Remove all sources of ignition including smoking materials, and sources of electrical discharge from the area when oxygen is in use. In the presence of high oxygen concentrations, even relatively small nonflammable items can ignite and burn rapidly. Do not place auxiliary equipment producing sparks inside the device. Even small quantities of highly flammable items (such as organic solvents) may explode.

---



**Warning:** Monitor patient oxygen saturation during the calibration procedure to ensure no changes in patient oxygen saturation occur. Alternative sources of oxygen delivery methods should be available should patient need supplementation during calibration.

---



**Warning:** Oxygen monitoring with pulse oximetry or arterial blood gas measurements are extremely important for regulation of the concentration of inspired oxygen when an oxygen-enriched environment is considered necessary.

---



**Warning:** The oxygen system must be calibrated at the same atmospheric pressure in which it is to be used. Operation at atmospheric pressures other than that present during calibration may result in readings outside the stated accuracy for the device.

---



**Warning:** Remote monitoring does not replace the need for direct patient observation by qualified medical personnel.

---



**Warning:** The computer or RS-232 user program must continuously verify connection to the device Control Panel and check for updated data.

---



**Warning:** If you connect the Nurse Call output to system which uses the normally open connection, a disconnected Nurse Call cable will not trigger an alarm.

---



**Warning:** Do not hang items from the canopy. Do not route leads or tubing over the top of the canopy or tape leads or tubing to the canopy, since raising the canopy could pull leads and tubing from patient or equipment connections.

---



**Warning:** Do not place objects on top of the canopy. When the canopy is raised, objects could fall off and injure the operator. Do not attach patient equipment to the canopy. Always check for accessories or objects that could be in the canopy's path before raising or lowering the canopy.

---



**Warning:** The Device must be properly reassembled per these guidelines. Improper reassembly of the Device may result in unsafe operation of the device.

---



**Warning:** After performing any repair or calibration, always perform the Service Checkout Procedure before putting the device back into service.

---

Cautions



**Warning:** Allow the heater to cool before servicing.

---

---



**Warning:** Be sure the front of the chassis is supported before removing the screws from the bracket to prevent the chassis from falling.

---

## Cautions



**Caution:** Do not allow alcohol or substances containing alcohol, such as hand-disinfectants, to come in contact with any acrylic part. Alcohol can cause clouding of acrylic parts. After using a hand-disinfectant, allow your hands to thoroughly dry before touching the device.

---



**Caution:** Do not remove the compartment sensor mounted to the bed panel on the Control Panel end; the compartment sensor must remain in the correct position for proper operation.

---



**Caution:** Pins of connectors identified with the Electrostatic Discharge Sensitive symbol should not be touched and connection should not be made to these connectors unless Electrostatic Discharge precautionary procedures are used.

---



**Caution:** Do not mount or rest a radiant warmer or incandescent light on or over the device canopy; ineffective heating and damage to the canopy may result. If using incandescent phototherapy lamps, check manufacturer's recommended minimum distance to canopy.

---



**Caution:** Detailed information for more extensive repairs is included in the service manual solely for the convenience of authorized service personnel trained by General Electric having proper knowledge, tools and test equipment.

---



**Caution:** Do not clean or disinfect the device with organic solvents, scouring compounds, strong acids, or strong bases. These compounds may damage components.

---



**Caution:** Do not autoclave or gas sterilize any plastic parts unless stated otherwise in the manual.

---



**Caution:** U.S. Federal law restricts this device for sale by or on the order of a licensed medical practitioner.

---



**Caution:** This device is for professional use only.

---



**Caution:** Do not move the device by pushing or pulling on the bed panels. This action may lead to the deterioration and breakage of these components.

---



**Caution:** Do not place objects on the device legs.

---





**Caution:** To minimize the generation of static electricity, do not polish the side panels with a dry cloth.

---



**Caution:** Do not allow cleaning fluid to leak into skin temperature probe and electrical connectors. Equipment damage may occur.

---



**Caution:** Use of cleaning/disinfecting solutions containing chemicals not listed in the User Manual, i.e. alcohol, acetone, etc., or chemicals in greater concentrations than those listed in the Cleaning and Disinfecting Solutions section may damage the skin temperature probe.

---



**Caution:** Avoid placing excessive strain on the skin temperature probe wire. When cleaning, be careful not to pull on or bend the lead at the probe tip. Always remove the probe from the device by grasping the plug at the probe panel. Do not pull on the skin temperature probe wire. Do not immerse the skin temperature probe in liquid cleaner.

---



**Caution:** Do not use peroxide solutions to clean the humidifier water reservoir.

---



**Caution:** Do not clean the heating element/reflective dish or protective cover inside the canopy doors.

---



**Caution:** Do not manually force movement of the canopy up or down as this may result in component failures. If the canopy does not raise or lower at a normal speed, remove the device from service and refer to authorized service personnel for repair.

---



**Caution:** Do not submerge the mattress in any liquids.

---



**Caution:** Servicing of this device in accordance with this service manual should never be undertaken in the absence of proper tools, test equipment and the most recent revision to this service manual which is clearly and thoroughly understood.

---



**Caution:** The servo-control system must be calibrated at the same atmospheric pressure in which it is to be used. Operation at atmospheric pressures other than that present during calibration may result in readings outside the stated accuracy for the device.

---



































**Caution:** Do not over-tighten the hardware.

---




















## Symbols



















This section identifies the symbols that are displayed on the device. Equipment configurations can differ. Labels or symbols may not appear on every device

Symbol	Description
	Consult Manual
	Do Not Place Objects Under Radiant Heat
	Alternating Current
	Do Not Lean on Equipment
	Do Not Reuse
	Date of Manufacture
	European Representative
	This device is for professional use only by trained clinicians. <b>Note:</b> This symbol is used on non-US devices.
	Ground Equalization Potential Post
	Protective Earth Terminal
	Scale
	Serial Number
UDI	Unique Device Identifier. The UDI is a unique marking for identification of the medical device.
	Maximum Weight
	Maximum Patient Weight
	Manufacturer
	Model or Part Number
	Lower Bed











Symbol	Description
	Hot Surface
	Skin Temperature Probe Connector
	Compartment Sensor Connector
	Maximum Weight per Rail
	Maximum Water Level in Humidifier
	Opening the Giraffe Humidifier Reservoir
	Electric Shock Hazard
	Type B Equipment
	USB Port (for use by authorized service personnel only)
	Ethernet Port
	Electrostatic Discharge Sensitive
	Do not immerse scale
	This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.
	Fragile Handle with Care (on package)
	Keep Dry (on package)

Symbols

Symbol	Description
	Relative Humidity Range (on package)
	Temperature Range (on package)
	Pressure Range (on package)
	This End Up (on package)
	Air Boost
	Humidity
	Oxygen
	Timer
	Scale
	Trends
	Setup
	Help
	Alarm
	Comfort Zone
	Baby Mode
	Warm-Up Mode / Manual Mode
	Air Mode
	Start the Timer
	Stop the Timer

Symbol	Description
	Reset
	Apgar Tone
	Time Stamp
	Alarm Volume (low)
	Alarm Volume (low medium)
	Alarm Volume (high medium)
	Alarm Volume (high)
	Arrow to increase setting
	Arrow to decrease setting
	Re-weigh
	Baby Temperature
	Set Temperature
	Air Temperature
	Screen Locked
	Screen Unlocked
	Heater Power Level
	Heater Power
	Alarm Disabled

Symbols

Symbol	Description
	Alarm Acknowledged
	Alarm Off Indicator
	Alarm Pause Indicator
	Alarm Acknowledge Indicator
	Low Priority Alarm
	Medium Priority Alarm
	High Priority Alarm
	Skin Temperature Probe Indicator
	Away Screen Button
	Unit Weight

Beginning in September 2016, some medical devices sold in the USA must be labeled with a Unique Device Identifier (UDI). The UDI label will be located on or adjacent to the serial number label on the device. Example of UDI label format:



## Regulatory



GE Healthcare has declared that this product conforms with the European Council Directive 93/42/EEC Medical Device Directive when it is used in accordance with the instructions provided in this Manual.

### Standards

This device is designed to meet requirements of:

- ANSI/AAMI ES60601-1
- CSA C22.2 #60601-1
- IEC 60601-1
- IEC 60601-1-2
- IEC 60601-2-19
- IEC 60601-2-21
- 2002/96/EC WEEE directive
- 21 CFR CH-1 Section 1020.30 (n)
- ISO 19054 with an exception claim to clause 5.2.7.2. Slight deformation of rail occurs after application of 500N to wide surface of DIN rail.

## User Responsibility

This Product will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts, when assembled, operated, maintained, and repaired in accordance with the instructions provided. This Product must be checked periodically. A defective Product should not be used. Parts that are broken, missing, plainly worn, distorted, or contaminated should be replaced immediately. Should such repair or replacement become necessary, GE Healthcare recommends that a telephone or written request for service advice be made to the nearest GE Healthcare Regional Service Center. This Product or any of its parts should not be repaired other than in accordance with written instructions provided by GE Healthcare and by GE Healthcare trained personnel. The Product must not be altered without GE Healthcare's prior written approval. The user of this Product shall have the sole responsibility for any malfunction that results from improper use, faulty maintenance, improper repair, damage, or alteration by anyone other than GE Healthcare.





# About this Manual

This service manual describes the repair and maintenance of the Giraffe OmniBed.



**Warning:** After performing any repair or calibration, always perform the Service Checkout Procedure before putting the device back into service.

---



**Caution:** Servicing of this device in accordance with this service manual should never be undertaken in the absence of proper tools, test equipment and the most recent revision to this service manual which is clearly and thoroughly understood.

---

## Intended Audience

The intended users for this service manual are authorized service personnel.

The information contained in this service manual pertains only to those models of products which are marketed by GE Healthcare as of the effective date of this manual or the latest revision thereof. This service manual was prepared for exclusive use by GE Healthcare service personnel in light of their training and experience as well as the availability to them of parts, proper tools and test equipment. Consequently, GE Healthcare provides this service manual to its customers purely as a business convenience and for the customer's general information only without warranty of the results with respect to any application of such information.

Furthermore, because of the wide variety of circumstances under which maintenance and repair activities may be performed and the unique nature of each individual's own experience, capacity, and qualifications, the fact that a customer has received such information from GE Healthcare does not imply in anyway that GE Healthcare deems said individual to be qualified to perform any such maintenance or repair service. Moreover, it should not be assumed that every acceptable test and safety procedure or method, precaution, tool, equipment or device is referred to within, or that abnormal or unusual circumstances, may not warrant or suggest different or additional procedures or requirements.

This manual is subject to periodic review, update and revision. Customers are cautioned to obtain and consult the latest revision before undertaking any service of the equipment.

## Technical Competence

The procedures described in this service manual should be performed by trained and authorized personnel only. Maintenance should only be undertaken by competent individuals who have a general knowledge of and experience with devices of this nature. No repairs should ever be undertaken or attempted by anyone not having such qualifications. Genuine replacement parts manufactured or sold by GE Healthcare must be used for all repairs. Read completely through each step in every procedure before starting the procedure; any exceptions may result in a failure to properly and safely complete the attempted procedure.

## Conventions

This section introduces the various types of warnings, cautions, information notes, and symbols used in this manual to alert you to possible safety hazards and to provide you with additional information.



**Warning:** A Warning statement is used when the possibility of injury to the patient or the operator exists. *(The warning icon is yellow.)*



**Caution:** A Caution statement is used when the possibility of damage to the equipment exists.



**Sensitive to electrostatic discharge caution:** An Electrostatic Discharge (ESD) Susceptibility symbol is displayed to alert service personnel that the part(s) are sensitive to electrostatic discharge and that static control procedures must be used to prevent damage to the equipment.

---

**Note:** A Note provides additional information to clarify a point in the text.

**Important:** An Important statement is similar to a note, but is used for greater emphasis.

# Chapter 1: Functional Description

This chapter provides a functional description for the device, including sections representing each of the four boards. Refer to “[Figure 1-1 Block Diagram](#)” and section “[8.21 Wiring Diagrams](#)” when studying this chapter.

## 1.1 Control Board

The Intel 80C188EC microcontroller is an enhanced X86 processor with many on-board peripheral features, such as a interrupt controller, DMA controller, peripheral chip select driver, programmable timers, etc. The two programmable timers are used to control the two heaters (bed and radiant). The input to these timers is line frequency. This allows the control signal to be synchronized with the line frequency to better control the zero-crossing solid state relays. The on-board interrupt controller has several interrupts: analog-to-digital converter (ADC) conversion ready signal, overtemperature comparator output, watchdog output, power fail signal, and module interrupt signal from the system data bus. The microcontroller external bus is a multiplexed address and data bus.

The system memory consists of a programmable read-only memory (PROM) and static random access memory (SRAM). The EEPROM is used for calibration and biomedical configuration values. This memory holds the data even after power is turned off.

The RS-485 integrated circuit converts the RS-232 TTL signals from the microcontroller to RS-485 signals for the bus. This bus is the main communications bus from the control board to the display board, scale, and servo oxygen board.

There are two isolation transceivers used to isolate the circuits powered by +5V and the circuits powered by +5VSTBY (PF Battery backup).

The board contains a 16 channel multiplexer. There are seven temperature measurement channels. These channels measure the two patient skin temperature probes and the compartment probe (with two thermistors each), and the heat sink sensor used to measure the heat sink temperature. Additional channels include the humidity sensor (RHIN), LINE COMP & LINE COMP2, 5 Volts, Motor current, Vthref, VDAC, and 1.2Vind.

Attached to the compartment probe connection is the relative humidity signal conditioning circuitry. The 1V reference that is used for the analog circuitry is also the maximum input voltage and the offset voltage for the ADC. This yields a purely ratiometric system.

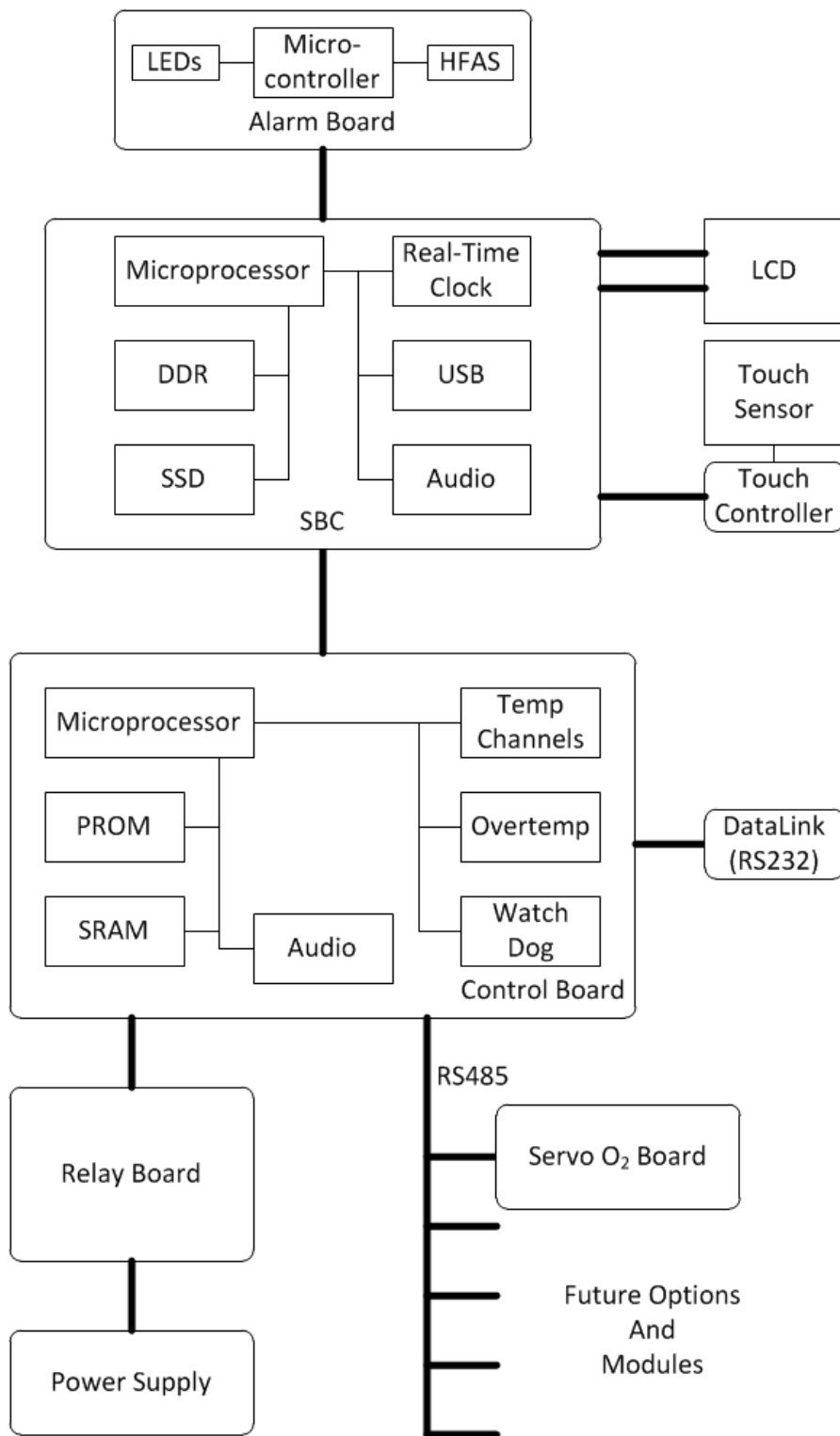


FIGURE 1-1. Block Diagram

The overtemperature circuit compares the air temperature to a reference level, generates an interrupt, and turns off the heat if the air temperature is higher than the reference level. The overtemperature circuit requires varying its voltage levels to accommodate various thermistor measurements. This is because the calibration is digital (no potentiometer).

The watchdog circuitry monitors the 80C188 microprocessor, and monitors the +5V and +5VSTBY voltages. It generates the interrupt signal and power failure signal to the 80C188 microprocessors. The audio circuit includes a 8752 microcontroller that reads a wavetable located in a PROM and sends the table to a digital audio circuit and amplifier. The high priority (HP) and other alarm signal lines select an output at the correct frequencies.

Three OR gates are combined to generate the error signal. The inputs to the circuit are overtemperature, power failure, and system failure. This circuit generates an error signal that turns off the heater and sounds the HP alarm. This circuit is independent of the microcontroller.

## 1.2 Relay Board

The Relay Board includes 2 safety relays, which close to supply mains power to the heater and motor circuits. Safety relay 1 is wired in series with the primary coil of the isolation transformer for the incubator and radiant warmer heaters. Safety relay 2 closes the mains supply to the humidifier isolation transformer and the transformer for the elevating base and canopy motors. Control signals for the two relays originate on the Control Board.

The Relay Board interfaces the DC control signals to the two chassis mounted solid-state relays (SSRs), which control the incubator and radiant warmer heaters individually. The control signals for the two heater SSRs originate on the Control Board.

The Relay Board includes a SSR for the humidifier. The SSR output is wired in series with the humidifier heater. The humidifier SSR control signal originates on the Control Board.

There is one current sense circuit for the incubator and radiant warmer heaters and an additional one for the humidifier heater. These circuits consist of a small signal transformer that produces a current proportional to the current through the heater circuits. The current is rectified and measured. The subsequent comparator then generates a digital level based on a specified current level. This results in a signal to the Control Board representing the state of the heater (on or off).

The two line compensation circuits consist of a signal transformer connected to the mains voltage. The secondary of this transformer feeds a full wave rectifier and capacitor. The resulting DC voltage is proportional to mains voltage, and it is measured on the Control Board.

The line frequency circuit consists of a full wave rectifier and a comparator. This circuit generates a digital pulse with frequency twice that of the line frequency (50 or 60 Hz). The output signal is provided to the Control Board.

The Relay Board provides the +5v standby power supply to the entire Giraffe system. A +5V regulator generates the +5V standby from the diode OR combination of the system +12V power supply or the PF Battery. If there is no mains power, then +12v is not present, and the battery will generate the +5V standby. When +12V is present, the battery is biased out of the circuit with the diode and is merely being trickle charged through a resistor. **The battery charges only when the device is powered on.**

### Infant Care Single Board Computer (ICSBC)

The motor driver circuit turns the DC motor coils in the incubator airflow fan motor on and off based on feedback from the hall effect position sensors. This integrated circuit can also vary the speed and brake the motor based on input signals from the Control Board.

The airflow sensor consists of an opto-coupler that outputs a clocking pulse proportional to the fan movement. The signal is AC coupled to eliminate offset voltages and drifts. The resulting pulse is half wave rectified and stored in a capacitor to yield a DC voltage proportional to the fan speed. If the fan stops or there is no fan, this DC voltage becomes zero. The output signal is provide to the Control Board to indicate proper airflow motor operation.

The canopy and elevating base motor control circuits consist of a series of three relays. The speed relay connects the 15 volt secondaries of the toroidal transformer in parallel (with 15 volt output) for lowering the canopy and in series (with 30 volt output) for raising the canopy and raising or lowering the elevating base. The direction relay reverses the polarity of the voltage output from the speed relay depending on the direction of travel. The E/H select relay switches the output voltage from the direction relay to the canopy or elevating base motor depending on the switch that is pressed.

To minimize arcing in the relay contacts, the EH Activate MOSFET is switched off while the relays are switched for the proper voltage, direction, and motor. Once the relays are set, the MOSFET is switched on and proper voltage is applied to the correct motor.

The motor current sense circuit consists of a small signal transformer that produces a current proportional to the motor current. The transformer output current is converted to a voltage and filtered. An output voltage indicative of the motor current amplitude is provided to the Control Board. A subsequent comparator then generates a digital level based on a specified current level. This results in a signal to the Control Board indicating whether or not the e-base motor is stalled.

The Relay Board interfaces the user and system status input switch signals to the Control Board. Switch signals include, e-base and canopy activation, canopy and heater door position, and humidifier reservoir and water level status.

## 1.3 Infant Care Single Board Computer (ICSBC)

The primary function of the ICSBC is to provide a microprocessor based User Inetrface controller for the infant care device. Other functions include serial communication interfaces to support both internal and external peripherals and networks, display interface to support an internal LCD, and audio output to drive a board-mounted speaker. The ICSBC is located in the display assembly.

**Note:** Speaker may not be installed.

The ICSBC is powered by the +12V DC power and the +5V DC power provided by the Rail Power Cable (6600-0706-700).

The ICSBC has a 600MHz Intel Atom microprocessor with 512MB of DDR2 RAM and 4GB of Solid-State Drive storage. The microprocessor has an integrated memory controller, GPIO, PCIe, HD Audio, real-time clock, and video processor. The microprocessor communicates via PCIe to an Intel I/O Controller companion chipset that provides the following additional interfaces: GPIO, UARTs, SATA, Ethernet, and USB 2.0.

The ICSBC provides the necessary circuitry to drive a 6/8 bit LVDS interface for an embedded LCD. It is capable of driving either constant-voltage or constant-current power for LED backlights. It also provides on/off and dimming control of the backlights. The ICSBC interfaces with the touch screen controller via an internal USB 2.0 interface.

The ICSBC provides two user accessible I/O ports located at the lower rear area of the display assembly. One is a USB 2.0 Host with a Type A female connector. The USB port is used for software upgrades with a USB Flash Drive. The other is a 100Base-TX Fast Ethernet port with a RJ-45 connector. The Ethernet function is disabled but could be enabled with a future version of software.

The ICSBC has two internal communication and control interfaces. One is the CAN bus communication with the Alarm Board. The other is with the Giraffe Control Board located in the main electronics enclosure. The connection to the Control Board is through the 14 pin ribbon cable which contains several control lines and the RS-485 Bus for serial communication.

## 1.4 Alarm Board

The primary function of the Alarm Board is to provide visual indicators during alarm conditions. Other functions include hands-free alarm silence (HFAS), power-fail detection, and power-fail visual alarms. The Alarm Board is located in the top of the display assembly so it can illuminate the alarm lens and interface to the HFAS lens.

The Alarm Board is powered by the +12V DC power under normal conditions and the +5V DC STBY power in power fail conditions. In power fail, the Alarm Board enables a red LED for visual indication.

The Alarm Board has a 32-bit ARM microcontroller that communicates with the host microprocessor on the ICSBC via the CAN bus. The CAN bus allows the Alarm Board to receive commands from the SBC and provide status to the ICSBC. When commanded, the Alarm Board will enable or disable the 4 white LED's that function as a beacon light to indicate the presence of an alarm condition. If CAN communication is lost, the Alarm Board will indicate an equipment failure by enabling the 4 red LED's and activating the board-mounted buzzer.

The Alarm Board contains the circuitry that provides the hand-free alarm silence function. The HFAS function is implemented using infrared (IR) emitting LED's and an IR sensor. The IR sensor measures the IR signal that is reflected from a hand passing in front of the HFAS lens. The microcontroller contains the HFAS software to control the IR emitter and digitize the reflected signal. Additional filtering and processing is necessary to determine if and when a valid HFAS event has occurred. The status of HFAS events are sent to the ICSBC host microprocessor via the CAN bus.

## 1.5 Power Supply

The universal input (80-264 VAC) switching power supply converts the line voltage to +5V DC (0.5A max) and +12V DC (10A max). This power supply can source up to 120 watts. The +5V DC and +12V DC are sent to the Relay Board for distribution to the other device electronics (Control Board, Servo02 Board, RS-232 Board, In-Bed Scale, SBC, and Alarm Board). The two DC voltages can vary by + 10%; the acceptable voltage ranges are +4.5 to +5.5V DC and +10.8 to +13.2V DC.

## 1.6 Peripheral Components

The heater isolation transformer isolates the incubator and radiant warmer heaters from the mains voltage.

The primaries mains input voltage comes from the relay board and is switched by safety relay 1. The dual primaries are connected in parallel for 115 volt operation and in series for 230 volt operation. The isolated secondary output voltage is always 115 volts and is input to the relay board where it is used by the heater

### DataLink

current sense circuit. It then outputs from the relay board to the solid state relays and the incubator and radiant warmer heaters.

The humidifier isolation transformer isolates the humidifier heater from the mains voltage. The primaries mains input comes from the relay board and is switched by safety relay 2. The dual primaries and secondaries are connected in parallel for 115 volt operation and in series for 230 volt operation. The isolated secondaries output voltage is equal to the mains input voltage.

The Elevating Base/Canopy Motor (toroidal) transformer is used to reduce the mains voltage down to the range required for the elevating base and canopy motors. The primaries mains input comes from the relay board and is switched by safety relay 2. The dual primaries are connected in parallel for 115 volt operation and in series for 230 volt operation. The output voltage from each secondary is about 15 volts for both 115 and 230 volt operation and is input to the relay board motor control circuits.

The two identical solid state relays (SSR's) are used to switch the isolated 115 volts to the incubator and radiant warmer heaters. The SSR's are mounted to the back panel of the electronics enclosure below the toroidal transformer. The upper right SSR controls the incubator heater and the lower left controls the radiant heater.

The 8.4 NiMH PF Battery is connected to the relay board. It is used to power the +5 STBY during power fail. The battery is re-charged only when the device is powered on.

### 1.6.1 Rail and Heater Door Switches

There are seven switches used to determine the position of the canopy and the heater doors.

Two normally open switches on each heater door determine the position of the doors. Each switch is wired in series with the corresponding switch on the other door. One pair of switches closes only when the doors are fully open and the other pair closes only when the doors are fully closed.

There are 3 normally open switches in the right upright which are used to determine the position of the canopy. The top switch closes when the canopy reaches the upper position. The middle switch detects when the canopy is about half way down. The bottom switch closes when the lowest position is reached.

The device will function as a warmer only if the two heater door open switches and the top rail switch are all closed.

The system will control as an incubator only if the bottom rail switch and the two heater door closed switches are all closed.

As the canopy lowers the system senses the closure of the middle rail switch, then looks at the heater door closed switches. If they are not closed, the canopy will stop at that position and the Heater Doors Not Closed alarm will activate. This insures that the canopy will not lower to the lowest position if the heater doors are not closed.

## 1.7 DataLink

The primary functional responsibility of the Datalink (RS-232 Board) is to provide an isolated RS-232 interface for the DataLink serial communication bus and an isolated set of relay contacts for use with a NurseCall remote alarm system. The signals for both functions are available from a single, 9-pin, D-Sub connector on the rear panel of the main electronics enclosure.



The RS-232 Board contains the electronic circuitry necessary to provide a 1500 VRMS isolated serial interface which meets the EIA/TIA-232E specification and a 1500 VRMS isolated single-pole double-throw (SPDT) relay. The relay contacts are rated for 24 VDC and 0.5 amps of current.

For further details on the connector pinout and DataLink data protocol, see “RS-232 Serial Data” on page C-1 for more information.

**Note:** The Ethernet port is not functional, the USB port may be activated only while in Service Mode for the purpose of software update.

## 1.8 Servo Controlled Oxygen Option

The Giraffe Servo Control Oxygen System consists of an oxygen sensing circuit, Servo Oxygen circuit board, and an oxygen delivery system.

The sensing circuit is located beneath the bed and consists of a pair of fuel cell oxygen sensors, a three-way solenoid calibration valve, and a calibration fan. In normal operation the calibration valve is closed and allows the Giraffe fan to circulate gas from the patient compartment across the sensors.

**Note:** During the first 90 minutes of operation unit will not allow you to turn off air boost. To override this feature, refer to “Figure 2.2.4.2 Vent Fitting to O2 Sensor Leak Test” for details.

Reference GSOCs in the user manual.

The device must be calibrated at least every 24 hours when servo oxygen is in use. After 24 hours have elapsed the system prompts the user to perform calibration. Once the operator initiates calibration, the calibration valve opens and the calibration fan is turned on. This draws ambient air across the sensors until a stable reading is obtained. This 21% oxygen reference value is then used to calibrate the measuring algorithm. After calibration 100% oxygen is briefly delivered to the system to ensure there are no occlusions. When calibration is complete the device will resume controlling oxygen based on the last set point.

The system must have two sensors present to operate. One sensor is always used for control and the other is used for a redundant check and display. The sensors generate a voltage of about 5 millivolts at 21% oxygen concentration and about 90 millivolts at 100% oxygen concentration. The voltage is directly proportional to the concentration of oxygen. Humidity and temperature sensors located in the sensor plug are used for voltage compensation. A fan mounted to the sensor-housing panel is activated when the temperature reaches 50 degrees C. This fan circulates air to keep the sensors below the maximum allowable operating temperature, about 55 degrees C.

The Servo O2 board is located in the Giraffe controller enclosure. The microcontroller and integrated EPROM on the board perform the following:

- Convert sensor output from analog to digital.
- Activates oxygen alarm conditions.
- Two-way communications via RS-485 bus with the Giraffe control board.
- Controls the calibration valve to select calibration mode.
- Controls the two supply valves to maintain the desired oxygen set point.
- Opens the safety relay, which removes power to the three-way valve and the supply valves in case of a system failure.

The oxygen delivery system consists of two solenoid supply valves, and a regulator assembly. The preset regulator regulates the oxygen supply to 345 kPa (50 psi). Two supply valves, controlled by the Servo Oxygen

Humidifier

board, control flow to the patient compartment. Both valves are opened until the measured level gets close to the desired set point then one valve is closed. One valve is then cycled on and off as needed to maintain the desired oxygen levels in the patient compartment. The valve selected is alternated so both valves cycle about the same number of times. There are 2 fuses between the Servo O2 board and the supply valves that prevent high current from the board entering the valve housing should a short occur in the supply valves. A safety valve that shuts off oxygen flow whenever the canopy is raised actuates mechanically by the movement of the canopy support rail. When the canopy is down the valve is open (canopy up/valve closed). The safety valve actuates independently of the solenoid type supply valves.

1.9 Humidifier

Refer to the following diagram. Water enters the insulating cylinder (1) through a small hole in bottom. Steam rises along the heater cartridge protective insert (2) and is channeled between the heater mount (3) and the ramp block (4) and out the steam port (5).

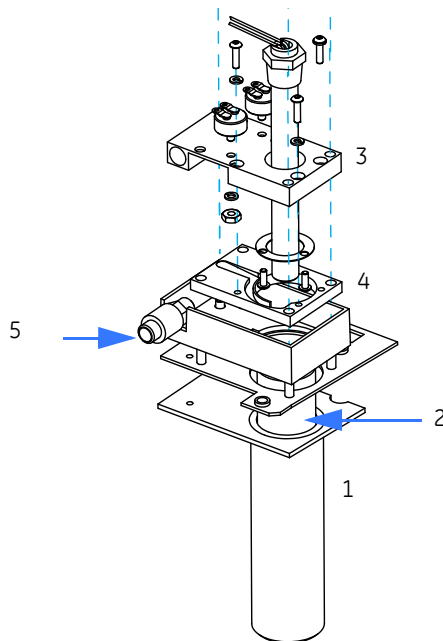
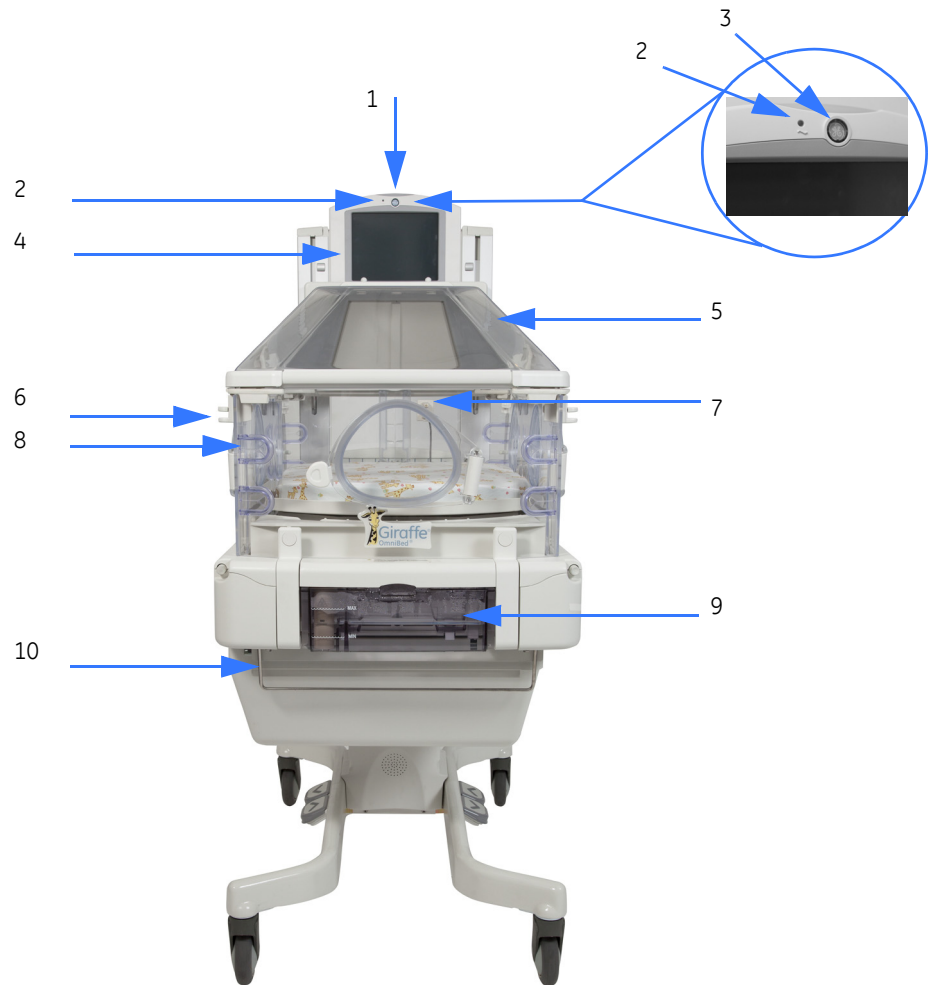


FIGURE 1-2. Humidifier

1.10 System Logs

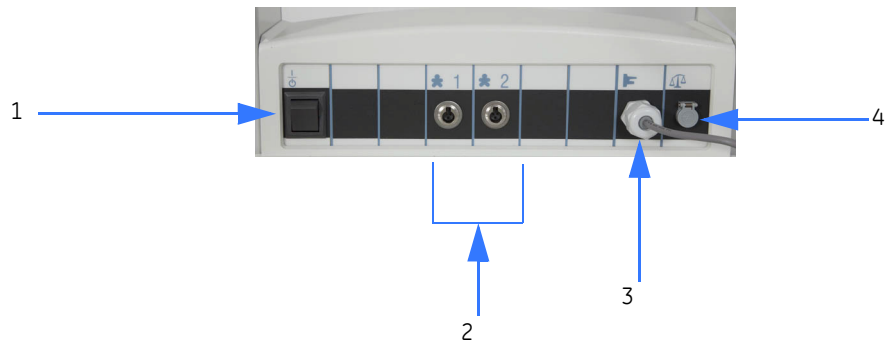
All system failures are logged to the error log. The error logs are only accessible through the service interface as described in the "Understanding the Service Interface" on page 4-1. The logs are stored to persistent medium which preserves log data across power cycles and loss of power. When the log reaches capacity, the oldest data is removed to provide space for newer data to be added.

## 1.11 Front View



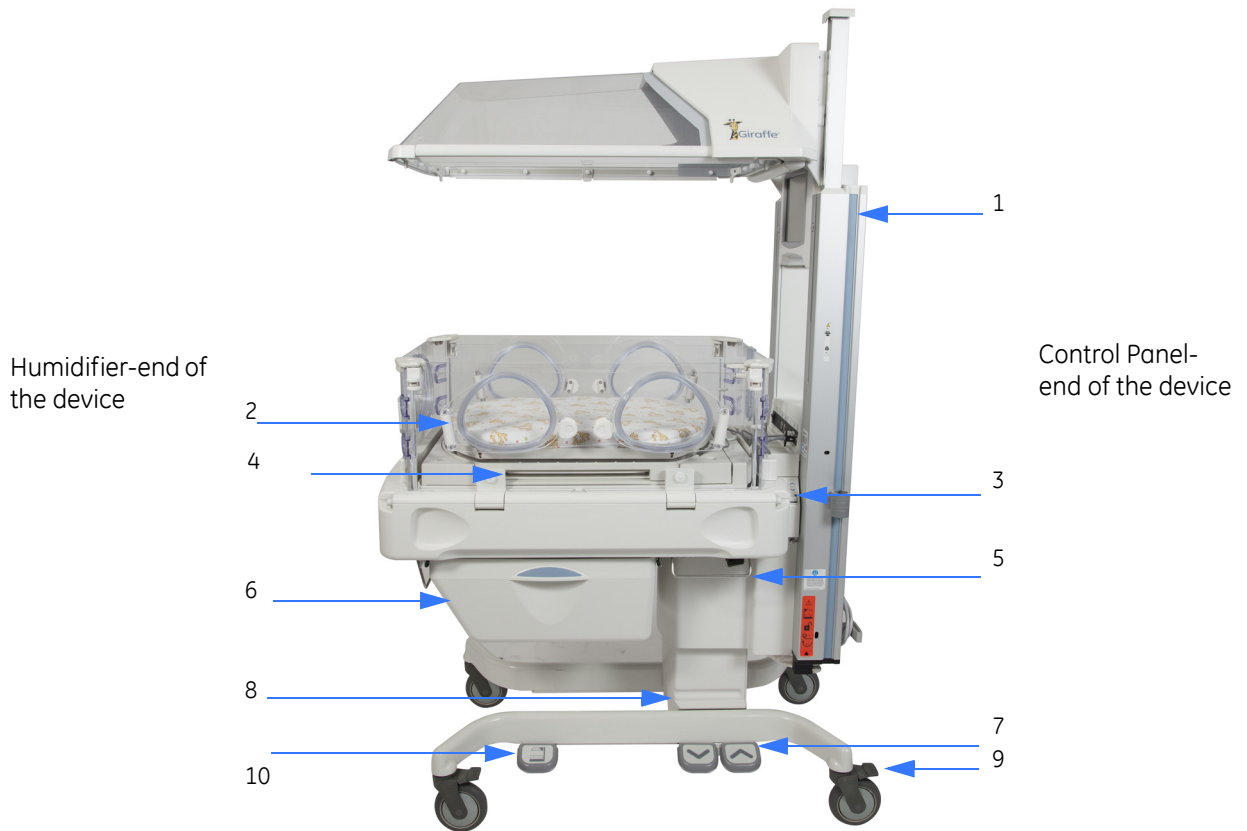
Feature Number	Description
1	Indicator Light
2	Power Fail/HFAS Indicator Light (Red Power Fail, Green HFAS)
3	Hands Free Alarm Sensor
4	Control Panel
5	Canopy
6	Side bed panel latches
7	Compartment air and humidity sensor (on rear bed panel on Control Panel end)
8	Tubing management grommet
9	Humidifier Water Reservoir (air filter located behind humidifier)
10	Pleural drainage hanger

### 1.12 Probe Panel



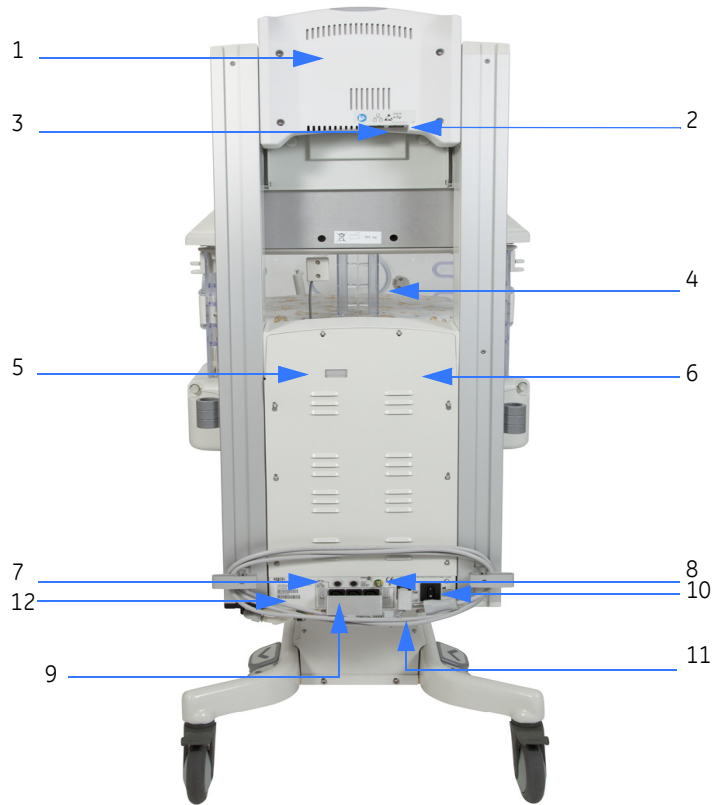
Feature Number	Description
1	Standby power switch (I/O)
2	Skin temperature probe connectors
3	Compartment air/Humidity sensor connector
4	Scale connector

## 1.13 Side View



Feature Number	Description
1	Mounting rail
2	Portholes
3	Canopy raise/lower arrows (switches)
4	X-ray Tray
5	Pleural drainage hanger
6	Storage drawer
7	Bed Raise/Lower pedal
8	Elevating column
9	Wheel brake
10	Raise canopy pedal

### 1.14 Rear View



Feature Number	Description
1	Control Panel cover
2	USB port
3	Ethernet port
4	Ventilator access
5	RS-232 connector for DataLink option
6	Rear Panel cover
7	Circuit breakers for accessory outlets
8	Grounding Post
9	Accessory power outlet connectors
10	Mains Power Switch
11	Power cord connector
12	Serial number

# Chapter 2: Installation and Service Checkout

## 2.1 Installation

The OmniBed is shipped with the canopy in the locked down position. Before the canopy can be raised the rail shipping locks must be released. They are located in both sides of the OmniBed near the outside bottom of the uprights. An orange tear-away label marks their location. The lock consists of a socket head cap screw in a slot. Tightening the screw disengages the screw head from the slot and releases the lift rail. Using the 4 mm hex key provided with the device, turn the screw clockwise about 8 rotations until the screw securely seats in its hole. Remove the tear away label. Perform all steps in Chapter 2 Installation and Service Checkout including the pre-use checkout as indicated.

For units shipped with the Servo Oxygen option, the Oxygen Cells are shipped separately and must be installed at the time of product installation. Be sure to complete the procedures in “Installing Oxygen Sensors” on page 7-60 before performing the Servo Oxygen portions of the Service Checkout procedures in this section of this document.

When mounted to the Carestation unit, electrically powered accessories must be plugged in using the IEC accessory outlets provided on the back of the Carestation unit. During installation, it is necessary to remove the plug retaining bracket. Be sure to install the plug retaining bracket as shown in “Power Cord Condition” on page 2-2 of this document.



**Warning:** Do not perform the service checkout procedure while the patient occupies the device.

---



**Warning:** Complete the service checkout procedure section of this manual before putting the device into operation. If the equipment fails any portion of the checkout procedure it must be removed from use and repaired.

---

## 2.2 Service Checkout



**Warning:** The use of accessories, replacement parts, or power cords other than those specified by the manufacturer may affect the performance of the device and could result in damage to the device or unsafe operating conditions.

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**Warning:** Insulation on electrical wiring can deteriorate with age. Check for brittle or deteriorated insulation on power cord and all other electrical wiring.

---

**Note:** All steps required to complete the pre-use checkout are included in the Service Checkout Procedures.

### 2.2.1 Mechanical Checks

The following procedures verify that the device is operational and ready to be used.

### Service Checkout

#### 2.2.1.1 Power Cord Condition

To verify the condition of the power cord:

1. Disconnect the power cord from the power outlet.
2. Examine the power cord for signs of damage.  
If damage is evident, replace the cord. Do not put in service. Consult authorized service personnel.
3. Verify that the plug retaining brackets for the power cord and the accessory outlets on the back of the device are placed as shown.



#### 2.2.1.2 Parts

Examine the device overall for any damaged or missing parts.

#### 2.2.1.3 Wheel Operation

To verify wheel operation:

1. Check that all the wheels are in firm contact with the floor and that the device is stable.
2. Lock the wheel brakes by pressing with your foot.



3. Verify that the brakes hold the device in place by trying to move the unit.  
If the unit moves, press all brakes again and recheck. If the unit still moves, remove from service.
4. Place your foot under the brake and raise up to unlock it.
5. Move the device by pushing the mounting rails or the depressions on the corners of the device. Verify that the device moves smoothly.

#### 2.2.1.4 Bed Operation

To verify bed operation:

1. Power on the device as described in "Powering the Device" on page 4-1.
2. Open the two side bed panels and check that they swing all the way down and hang perpendicular to the bed.



3. Check that the bed panels are securely attached to the device and that the hinge pins are properly seated.
4. Check that the inner side bed panels are securely fastened to the outer side bed panels.
5. Close the bed panels and check that the latches hold the panels securely shut. The red latch open indicators should not be visible when the latches are engaged.
6. Check that the top of the bed panels meet the canopy seal.
7. Open the portholes by pressing on the latch. The porthole door should swing open.
8. Close the porthole and check that the latch holds the porthole door securely shut and that the porthole door seals tightly against the porthole gasket.
9. Check that all the porthole gaskets are in place and are in good condition.
10. Check that the tubing access grommets in the four bed corners and the large slot grommet at the Control Panel end of the bed are in place and are in good condition.
11. Slide out and rotate the mattress. The bed surface should rotate easily without binding. If the bed is properly seated and locked in place, the mattress will be level and the bed remains in place when released.
12. Rotate the mattress back into the straight position.
13. Check to see that the bed platform extends and stops when it is pulled out on either side.
14. Return bed platform to the center position.
15. Squeeze the tilt mechanism to check the operation of the bed tilt.
16. Press the pedals to raise and lower the bed all the way up and down to verify that the bed raises and lowers smoothly.
17. Push the raise canopy pedal and verify the canopy moves smoothly in one continuous movement to its upper limit, the heater doors open, and the device shifts into warmer operation in Manual Mode.
18. Repeat step 17 for the raise canopy pedal on the other side.
19. Check that the raise and lower arrows at the Control Panel end of the bed on both sides of the device raise and lower the canopy.
20. With the canopy raised, lift up on each bed panel to check that they swing all the way down and hang perpendicular to the bed.
21. Close the bed panels and check that the latches hold the panels securely shut.
22. Lower the canopy and verify that it stops when you remove your finger from the lower arrow. It stops automatically at its lower limit, the canopy seal makes contact with all four bed sides, and the device shifts into incubator operation.

### 2.2.1.5 Options Checks

This section verifies that options, such as shelves, are ready for use.

To verify options:

1. Visually check and feel to verify that optional equipment is securely mounted.
2. Set up any required suction or gas supply systems.
3. Consult the accompanying optional equipment manuals for individual equipment check out procedures.

### Service Checkout

#### 2.2.1.6 Nurse Call Checks

See Nurse Call and remote Monitoring in the User Manual for more information.

**Note:** This procedure is required only for customers who have or are installing a Nurse Call system. The Nurse call system must be installed and operational prior to executing this procedure.

To verify Nurse call system operation:

1. Connect the Nurse call (RS-232) connector (male) to the device (female socket) and the female connector to the appropriate male connection in the room (such as a head wall connection).
2. Plug in the device and turn the mains and Standby switches On.
3. Plug in the skin temperature probe.
4. Touch the **BABY TEMP** area and then Baby Mode.
5. Unplug the skin temperature probe to trigger an alarm.
6. Verify that an alarm has been received at the nurse call station.

#### 2.2.2 Control Panel Checks

To check Control Panel operation:

1. Power on the device as described in "Powering the Device" on page 4-1.
2. Verify the following during the startup sequence:
  - All the displays and indicators light.
  - The software revision appears.
  - The prompt tone begins.

Once these have been verified, the system is operational.

**Note:** If the device has been used in the last 2 hours, the patient history query also appears.

3. Connect the skin temperature probe to probe panel connector 1 on the probe panel at the Control Panel end of the bed.
4. Adjust the set temperature to silence the prompt tone.
5. Check the patient skin temperature probe. Warm it by placing it between your fingers, and verify that the patient temperature reading increases.

**Note:** If the skin temperature probe temperature is below 30°C, the display will show -L-. If the device is in the Baby Mode, there will also be a Baby Cold alarm.

6. Unplug the patient skin temperature probe, and check that both visual and audio alarms trigger in the Baby Mode.
7. Make note of the current control mode and temperature settings, and wait one minute. Then unplug the device from the wall outlet.  
An alarm sounds and the power failure indicator lights.
8. Wait 1 to 2 minutes, and plug the device back in.
9. Verify that the alarm cancels, and that the device returns to the same control mode and temperature settings it displayed before the power interruption.

**Note:** A fully charged battery supplies the power failure alarm for approximately 10 minutes. Total recharge time is 10 hours.

## 2.2.3 Humidifier Check

To check humidifier operation:

1. Turn on the Giraffe unit and verify that the Servo Humidity icon appears on the screen.
2. Set the **Humidity** to 65%.
3. Wait for 4 minutes. If no alarms appear (except for a possible "Add Water" message), the humidifier is operational.

**Note:** It is not necessary to have water in the reservoir to perform this test.

## 2.2.4 Oxygen Leak Tests

### 2.2.4.1 Oxygen Leak Test

To check if there is an oxygen leak:

1. Connect an acceptable hose from an oxygen supply to the oxygen inlet fitting on the device. Supply pressure should be between 310 kPa (45 psi) and 586 kPa (85 psi).
2. Touch Oxygen and use the arrows to set Oxygen to 21%. The display will show the actual concentration. Open the doors until the actual concentration reaches 21% (ambient).
3. Remove translation deck, tilt platform, upper pan, and fan.
4. Cover the heat sink vent near the fan shaft. You can use either adhesive tape or a short piece of surgical tubing. Make sure the tape or tubing will not interfere with fan rotation. Reinstall the fan and upper pan. It is not necessary to reinstall the tilt platform or translation deck.

**Note:** If the conical shaped rubber grommet was removed with the fan, when reinstalling fan, be sure that rubber grommet clicks into groove on fan shaft.

5. Power up the unit.
6. Run the Servo O2 calibration routine from the setup menu, and wait for the calibration complete message.
7. In approximately 20 seconds, the "Check O2 Supply" alarm should sound. If there is no alarm, the tubing between the sensor housing and the heat sink vent fitting has a leak or is disconnected. Repair the leak, and repeat steps 1 through 4 of this procedure.
8. After performing the test, power off the device. Remove the upper pan and the fan, and remove the adhesive tape or surgical tubing. Be sure to remove any residue on the heat sink left by the tape or tubing.
9. Reassemble the system, and run the calibration routine one final time.

### 2.2.4.2 Vent Fitting to O2 Sensor Leak Test

This test checks for leaks between the chassis vent fitting and the O2 sensors.

1. Connect an acceptable hose from an oxygen supply to the oxygen inlet fitting on the device. Supply pressure should be between 310 kPa (45 psi) and 586 kPa (85 psi).
2. Power up the device.
3. Set the Air Mode set point to the desired temperature.
4. Wait for the air temperature to stabilize. This could take about 45 minutes, depending on your circumstances. To reduce the wait time, it is advisable to set the temperature at or slightly above room temperature.

### Service Checkout

**Note:** During first 90 minutes of operation, the fan defaults to high speed, and the Air Boost icon is not


operational: 

**Note:** Even though the fan is in high speed, the Air Boost icon is not illuminated/animated.

5. Touch **Air Boost** to illuminate/animate the Air Boost icon (that is, to turn it on).

**Note:** The Air Boost icon should now be illuminated/animated: . The fan remains in high speed.

6. Touch and hold **Alarm Silence** for 5 to 10 seconds.

The Air Boost icon illumination/animation automatically turns off: . The fan switches to low fan speed.

**Note:** The Air Boost icon is now fully operational and will increase and decrease the fan speed as desired.

7. With the fan now in low speed, touch the **Timer** icon and then **Start** to start the timer. Wait 10 minutes to ensure stability of the Whisper Quiet Mode.
8. Select **Setup**.
9. Select **Calibrate Oxygen** on the setup menu to initiate calibration.
10. When calibration is completed, 100% oxygen is delivered for approximately 20 seconds to ensure there are no occlusions in the system. Do not turn off the device or disconnect the oxygen supply during this brief period after the 'Calibration Complete' screen appears. Exit calibration screen.
11. Select O2 icon on display screen to bring up Servo Control Oxygen menu.
12. Set O2 set point to 65%.
13. Touch the **Timer** icon then **Start** to start the timer and to verify that device reaches 60% in less than 10 minutes.

**Note:** If rise time is longer than 10 minutes, check all tubing between the O2 sensors and the chassis vent fitting. The chassis vent may be identified by its mushroom cap shaped cover. Make sure that the fan is in the low speed mode.

**Note:** Device should not be placed in service unless the calibration is successful and the rise time test passes.

**Note:** The Low O2 alarm may activate during the rise time test. Silence the alarm and let the test continue.

**Note:** The "O2 Cal Lost – No O2" alarm may appear after the device is turned on or returned from power fail condition. If this alarm appears, calibrate the oxygen sensors (as described in steps 7, 8 & 9) and resume use. If this alarm appears during normal operation, calibrate and continue use, but call service.

#### 2.2.4.3 Supply Valve Leak Test

1. Connect oxygen supply to Servo Oxygen inlet fitting.
2. Disconnect the 10 mm hose from the expansion chamber.
3. Power up device in Service Mode. (See "Understanding the Service Interface" on page 4-1.)

**Note:** The canopy should be closed for this step through step 9.

4. Touch **Calibration** in the left-navigation area.
5. The display area is populated with calibration options.
6. Touch **Servo O2**.
7. Open V1 and verify that gas flows audibly.
8. Close V1 and open V2 and verify that gas flows audibly.

9. Close V1 & V2 and place the 10 mm hose in a cup of water. Verify that no more than 10 bubbles appear over a one minute period. If device fails, replace supply valves.
10. Raise the canopy a couple of inches and open V1 & V2. Verify that no more than 10 bubbles appear over a one minute period. If device fails replace two-way valve or spring assembly.
11. When test is completed, reattach 10 mm hose to expansion chamber.

## 2.2.5 Scale Checks

### 2.2.5.1 Visual Inspection

1. Examine the scale parts for evident signs of damage. Examine the scale connector to make sure it is tightly assembled. Check for bent pins. If any of the parts are damaged replace them.
2. Ensure there is no mechanical interference between the scale cable and the unit.
3. Ensure the scale cable is not crossing over a corner tray of the bed. Move the corner tray if necessary.

### 2.2.5.2 Center Weight Check

**Important:** If the scale fails the weight check, calibrate it according to the procedure in section 3.6 and then perform the weight check again.

**Note:** One 5 kg Certified Test Weight (part number 6600-0209-800) is required to perform the weight check procedure.

1. Turn off the bed. Clear all objects from the bed, and ensure only the clear plate remains on the scale.
2. Ensure the bed is level.
3. Turn on the bed, and go to the service screen.
4. Record the SC value on the screen, and name it **SC1**. The SC1 value must be in the 9900 to 11000 range.
5. Place a 5 kg weight on the center of the scale on the bed. (See location **A** in Figure 2-1.)
6. Record the SC value on the screen, and name it **SC2**.
7. Subtract SC1 from SC2. The value must be 5000 +/- 10.

### 2.2.5.3 Off Center Weight Check

**Important:** If the scale fails the weight check, calibrate it according to the procedure in section 3.6 and then perform the weight check again.

**Note:** One 5 kg Certified Test Weight (part number 6600-0209-800) is required to perform the weight check procedure.

1. Turn off the bed. Clear all objects from the bed, and ensure only the clear plate remains on the scale.
2. Ensure the bed is level.
3. Turn on the bed, and go to the service screen.
4. Record the SC value on the screen, and name it **SC3**. The SC3 value must be in the 9900 to 11000 range.
5. Place a 5 kg weight on one corner of the scale on the bed. (See location **B1** in Figure 2-1.)
6. Record the SC value on the screen, and name it **SC4**.
7. Subtract SC3 from SC4. The value must be 5000 +/- 10.
8. Place a 5 kg weight on the second corner of the scale on the bed. (See location **B2** in Figure 2-1.)
9. Record the SC value on the screen, and name it **SC5**.
10. Subtract SC3 from SC5. The value must be 5000 +/- 10.

Service Checkout

11. Place a 5 kg weight on the third corner of the scale on the bed. (See location **B3** in Figure 2-1.)
12. Record the SC value on the screen, and name it **SC6**.
13. Subtract SC3 from SC6. The value must be 5000 +/- 10.
14. Place a 5 kg weight on the fourth corner of the scale on the bed. (See location **B4** Figure 2-1.)
15. Record the SC value on the screen, and name it **SC7**.
16. Subtract SC3 from SC7. The value must be 5000 +/- 10.

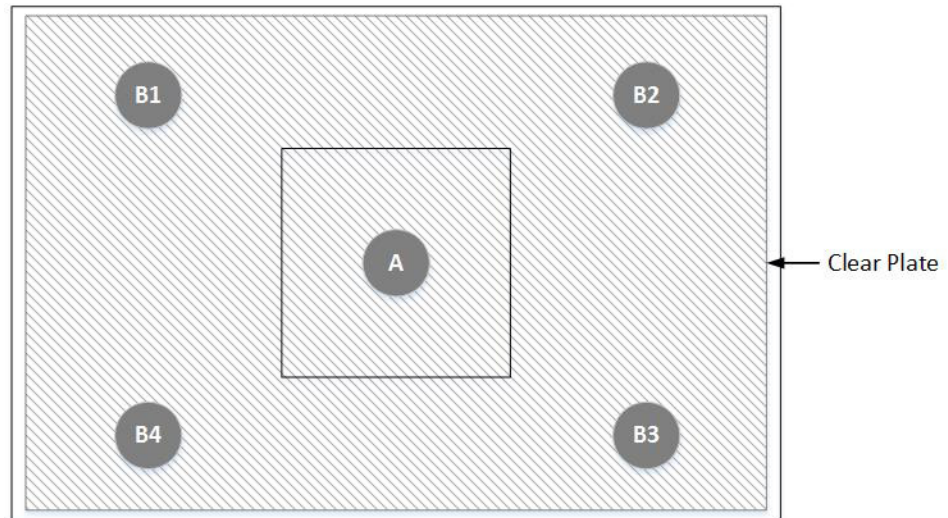


FIGURE 2-1. Weight Placement Locations

# Chapter 3: Calibration and Maintenance



## SENSITIVE TO ELECTROSTATIC DISCHARGE CAUTION

An Electrostatic Discharge (ESD) Susceptibility symbol is displayed to alert service personnel that the part(s) are sensitive to electrostatic discharge and that static control procedures must be used to prevent damage to the equipment.



**Warning:** After performing any repair or calibration, always perform the Service Checkout Procedure before putting the device back into service.

## 3.1 Service Maintenance Schedule

The device should be maintained in accordance with the procedures detailed in this manual. Service maintenance must be performed by a technically competent individual.

This schedule lists the minimum frequencies. Always follow hospital and local regulations for required frequencies.

Frequency	Details
Annually	Perform the electrical safety and calibration procedure as described in the service manual. Calibrate the scale as described in the service manual. Perform supply valve leak test on the Oxygen system. Replace vent screen on the Oxygen system. Replace sensor on the Oxygen system. It is recommended that both sensors be replaced at the same time. Sensor life of one year is approximate. If the sensor is used often at high oxygen concentrations, sensor life will decrease. Replace the clock battery.
Every two years	Replace the PF battery. <b>Note:</b> The PF Battery is used to sound the power failure alarm and to power memory circuits during a power failure.
Every three years	Calibrate the humidifier as described in the service manual. This action is to be performed by authorized service personnel. Replace the fan motor.

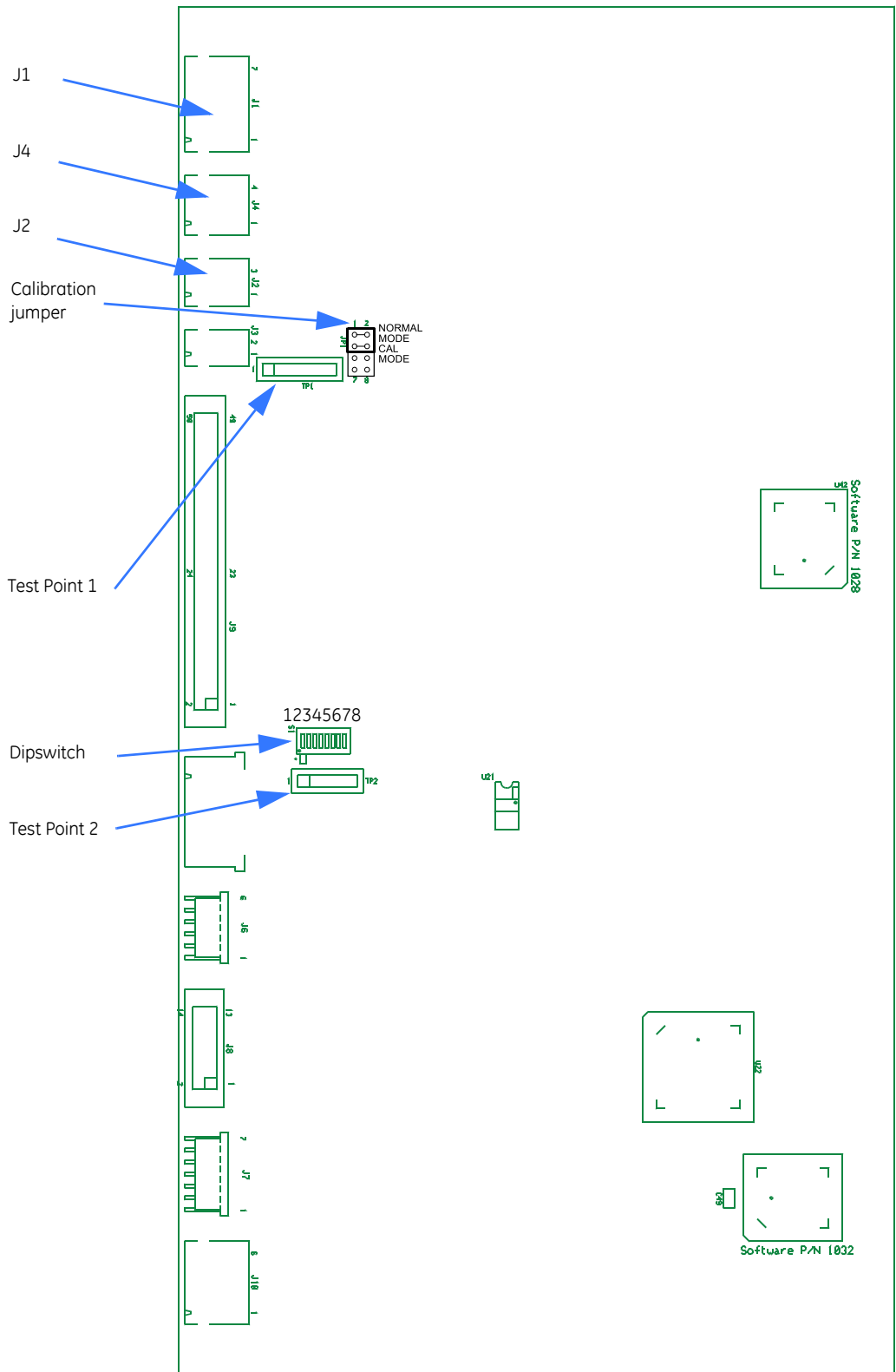


FIGURE 3-1. Control Board Test Points



## 3.2 Special Tools

The following tools (or their functional equivalents) are required to complete the recommended service procedures:

- Digital Multimeter, 4-1/2 digit
- Leakage Current Tester
- PLCC Extractor for removing socketed chips
- Static Control Work Station (recommended)
- Light gray touch-up paint (Munsell .16GY8.56-0.44 chroma), 18 ml ..... 6600-0714-200
- Servo Humidity Calibration Kit..... 6600-0048-850
- 5 kilogram (5000 gram) Certified Test Weight..... 6600-0209-800

## 3.3 System Calibration



**Note:** If only performing line voltage calibration, follow instructions in section 3.4.

**Important:** Be sure to perform System Calibration after replacing a control board.

1. Turn power off.
2. Remove electrical enclosure back panel.
3. Unplug the temperature sensors from J1, J4 and J2 on the control board.
4. Move jumper JP1 to the CAL MODE position on the control board (refer to “[Figure 3-1 Control Board Test Points](#)”). Be sure to orient the jumper correctly so pins 5-6 and 7-8 are shorted.
5. Turn power on.  
After running the power-up testing a progress bar is displayed at the top of the screen.  
Upon completion, the calibrate mode screen appears.
6. Using a 4 ½ digit DVM (capable of measuring to 0.1 millivolt) measure VREF at TP1, pins 1 and 6 (pin 6 is ground) on the control board. Measure to the nearest 0.1 millivolt. (Typical voltage reading will be 1.2350.)
7. Once "Enter reference voltages" is displayed, enter the VREF using the keypad.
8. Touch Enter.
9. Measure the Mains Voltage at the AC connectors at the bottom of the electronics enclosure cover.
10. Once "Enter mains voltages" is displayed enter the voltage using the keypad.
11. Touch Enter.
12. When complete, Calibration DONE appears across the top of screen. Do not shut off the device until the DONE message is displayed or the new calibration values will not be stored.
13. If the message “Mains voltage calibration failed. Please enter the mains voltage again” appears this indicates the entered line voltage is 20% different than the measured value (not the nominal value).
14. Power down the device and move the calibrate jumper to the NORMAL MODE position. Be sure to orient the jumper correctly so pins 1-2 and 3-4 are shorted.
15. System and line voltage calibration are complete.
16. Proceed to humidifier calibration.

### 3.4 Humidifier Calibration

**Important:** Be sure to re-calibrate the humidifier whenever either the sensor or the control board is replaced.

**Important:** In order for the water in the calibration bottle (6600-0048-850) to be completely saturated, most of the salt should not be dissolved. There should be as little standing water above the salt line as possible to minimize the response time. The salt in the calibration bottle may only be used for a period of one year after its initial mix with water then the kit should be discarded.

1. Take the cap off the humidity calibration bottle and add one half cap full of sterile distilled water to the bottle. Shake the bottle to thoroughly mix the salt and water solution. Place the smaller end of the elbow over the bottle.

**Note:** The solution in the calibration bottle should be approximately the same temperature as incubator's infant chamber. If you used cold water or calibration bottle was in cold environment, place the bottle in the incubator and allow it to warm before attaching it to the humidity probe.

2. Slide the elbow over the humidity sensor (mounted on the back panel) until it stops. This creates a 75% RH environment for the sensor.
3. Access service mode. (See "Understanding the Service Interface Layout" on page 4-3.)
4. Touch **Calibration** in the left-navigation area.  
The display area is populated.
5. Touch **Cal RH**.  
The Calibrate RH information screen appears.

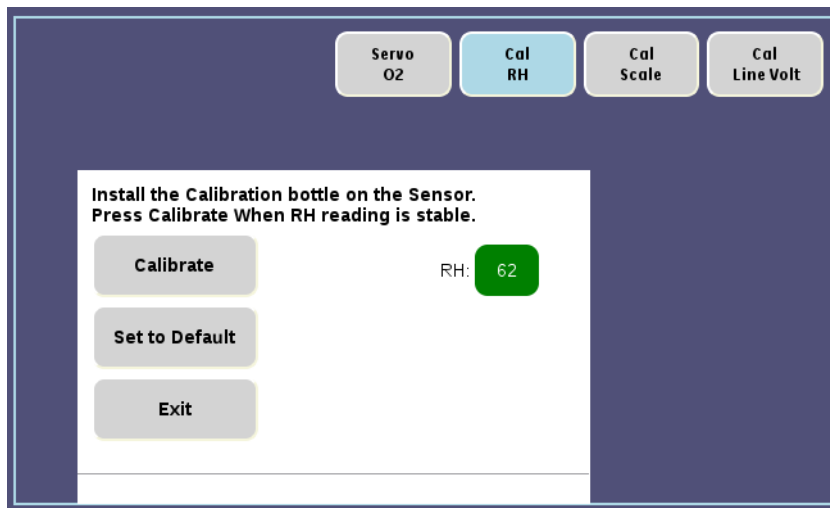


FIGURE 3-2. Cal RH

You can reset default values by touching Set to Default.

6. Wait until the Humidity reading is stable (does not change more than 1% RH in 5 minutes).
7. Select Calibrate, SET TO DEFAULT or EXIT. Calibrate initiates calibration. SET TO DEFAULT resets calibration values back to factory default settings. If you started calibration by mistake (without the calibration bottle in place, for example) you would select SET TO DEFAULT and then calibrate the device. If "RH Sensor Calibration Completed" is displayed, the calibration is complete., go to step 11.

8. If “RH Sensor Calibration Failed Try Again” is displayed, verify your setup and perform calibration again. This message appears if the signal from the RH sensor is outside the values expected from the sensor at 65-85% RH. If the failure persists it means the readings are out of this range and either the calibration bottle or the RH sensor may be defective.
9. Touch **Exit** to exit the RH calibration screen.

### 3.5 Servo Controlled Oxygen Calibration



**Warning:** The temperature for Oxygen Calibration, prior to patient use, must be stable for 30 minutes before performing Oxygen Calibration.

**Note:** For service only calibration, it is acceptable and proceed once the temperature stabilizes without any additional wait time. To further expedite the service calibration process it is also acceptable to set the compartment temperature to ambient (room temperature).

1. Access service mode. (See “Understanding the Service Interface Layout” on page 4-3.)
2. If calibrating for patient use, wait for temperature to stabilize then wait an additional 30 minutes before initiating calibration
3. In service mode, touch **Calibration** in the left-navigation area.
4. Touch **Servo O2**.  
The Servo O2 information screen appears.
5. Touch **Cal O2**.  
Wait for calibration to finish. Calibration is automatic and takes less than five minutes. When calibration is completed, 100% oxygen is delivered for approximately 20 seconds to ensure there are no occlusions in the system. Do not turn off the device or disconnect the oxygen supply during this brief period after the ‘Calibration Complete’ screen appears.
6. Touch **Exit** to exit the screen.

**Note:** The servo control oxygen system prompts for calibration every 24 hours, but the system may prompt for calibration if there is a large leak in the system (for example if a panel is open) for half an hour.



**Caution:** The servo-control system must be calibrated at the same atmospheric pressure in which it is to be used. Operation at atmospheric pressures other than that present during calibration may result in readings outside the stated accuracy for the device.

### 3.6 Scale Calibration

**Note:** For EU Member States, this scale has been designed and manufactured in accordance with the non-automatic weighing instruments (NAWI) directive, 2009/23/EC. To ensure complete compliance to the Directive, have the device calibrated by an accredited local test authority. If you are unable to identify a test authority, please contact your GE representative or distributor for assistance.

Periodic re-verification (calibration) of the scale must be performed in accordance of the National Regulations Governing Legal Metrology. The required re-verification frequency will vary by country. Contact your local weights and measures authority for more information.

### Scale Calibration

**Note:** One 5 kg Certified Test Weight (part number 6600-0209-800) is required to perform the calibration procedure.

1. Clear all objects from the bed, and ensure only the mattress and clear plate remain on the scale.
2. Ensure the bed is level.
3. In user mode, touch **Setup** on the Home screen. The Setup screen appears.
4. Touch the data Baby Name field **Enter here**. The keyboard appears.
5. If this is the first time accessing the application, enter **Pass0000** and go to step 6. If not, enter your password (password + PIN). The password is not case sensitive and may be typed in upper or lower case.
6. Wait for **Password Verified** to be displayed.
7. Turn off the Standby switch to turn off the device.
8. Turn on the Standby switch within one minute to turn on the device. The device restarts in service mode and is open to the Setup screen.
9. In service mode, touch **Calibration** in the left-navigation area. The display area is populated.
10. Touch **Cal Scale**.

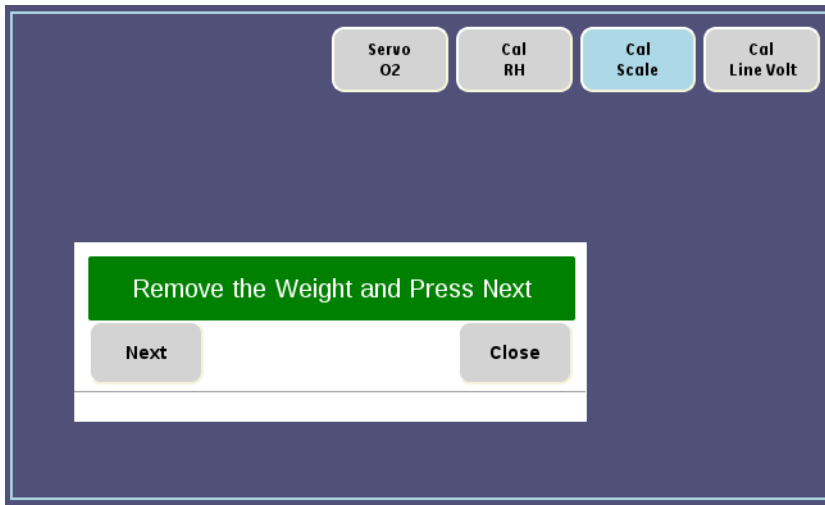


FIGURE 3-3. Cal Scale

11. When the screen prompts **Remove the Weight and Press Next**, verify the weight is removed and press **Next**.  
A series of instructions appears on-screen.

The screen prompts **Initializing** for a few seconds.

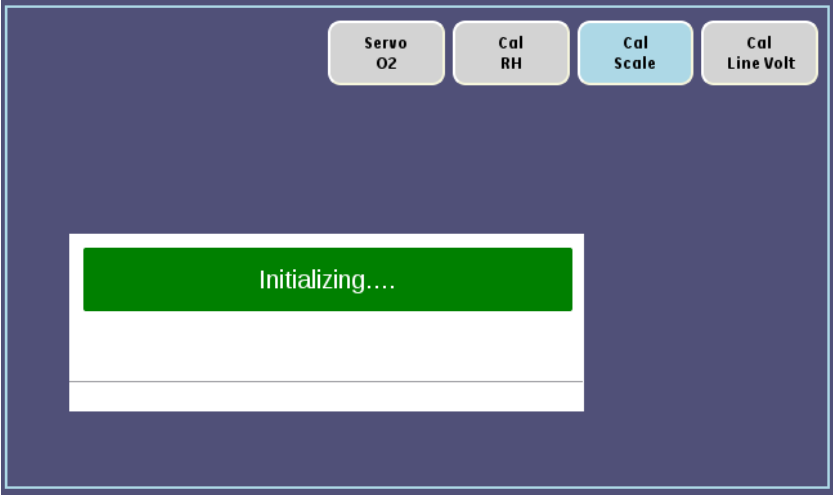


FIGURE 3-4. Initializing

- 12. When the screen prompts **Place Test Weight and Press Next**, place the weight and press **Next**.



FIGURE 3-5. Place Weight

Scale Calibration

The screen prompts **Measuring** for a few seconds.

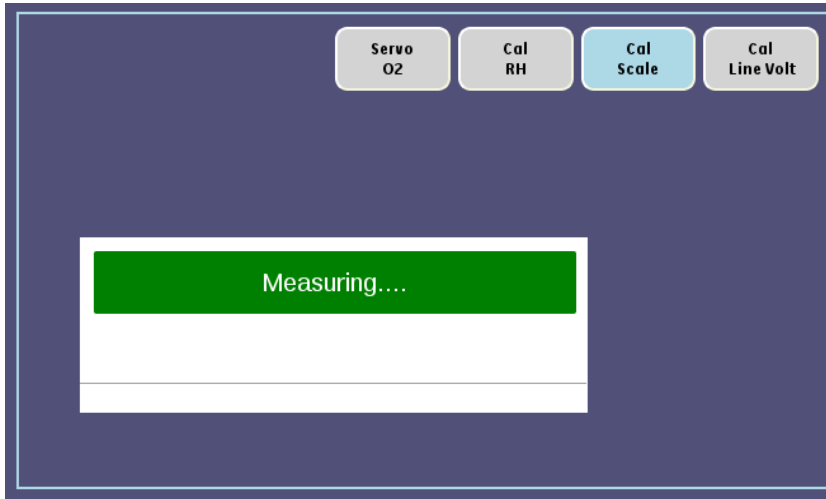


FIGURE 3-6. Measuring

13. When the screen prompts **Enter Test Weight**, type the test weight to the nearest gram and touch **Enter**.

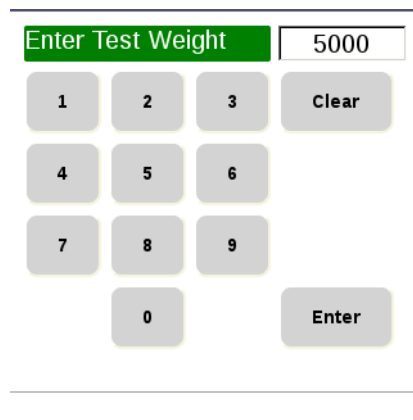


FIGURE 3-7. Enter Weight

For a successful calibration, the screen prompts **Calculating** for a few seconds.

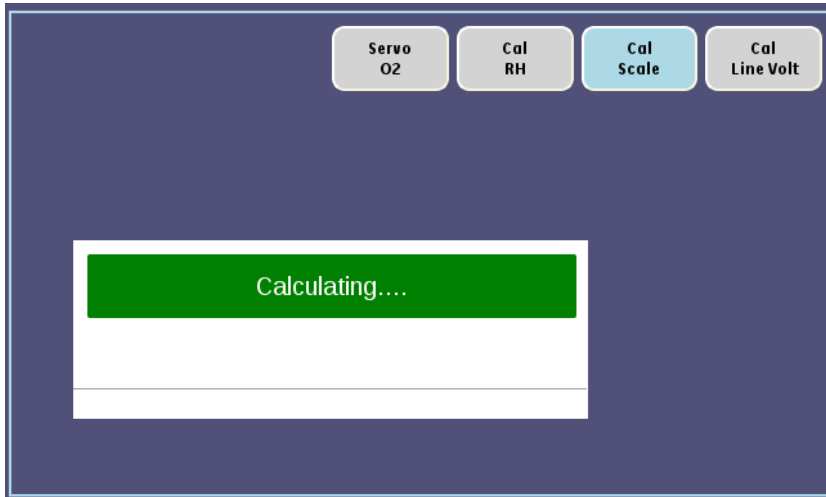


FIGURE 3-8. Calculating

14. When the screen prompts **Exit Only, Restore Defaults, Save and Exit**, touch **Save and Exit**.

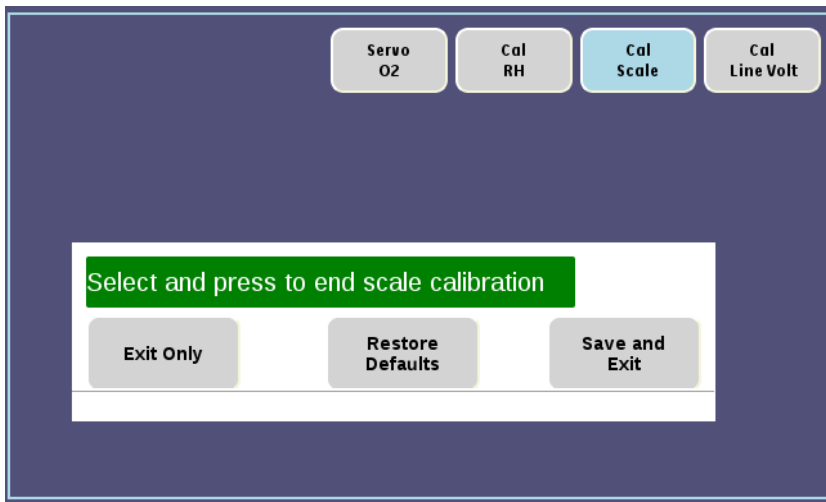


FIGURE 3-9. Completion

**Note:** If **Save and Exit** is grayed out, the calibration was not successful. Repeat the calibration.

15. Turn off the power to exit the service mode.

## 3.7 Electrical Safety Tests

Use an approved electrical safety analyzer to test the unit's ground continuity and leakage current.

For reliable leakage current readings the ground check should be performed first.

Measurement of insulation resistance is not recommended. Long term effects of repeated exposure of high voltage on the electrical insulation system of this medical device have not been fully evaluated.

### Electrical Safety Tests

Due to the nature of this medical device, leakage current testing as defined in IEC 60601-1 is recommended. Use of the direct method of leakage current test as defined in IEC 62353 is an acceptable substitution. Due to the design of this medical device use of the alternative method and differential method as defined in IEC 62353 is not recommended.

Follow the operating instructions supplied by the manufacturer of the electrical safety analyzer to verify the following:

#### 3.7.1 Ground

1. Measure the resistance between the ground pin on the line cord plug and exposed metal of the electronic enclosure. The ground resistance must be less than 0.2 Ohms.
2. Measure the resistance between the ground pin on the line cord plug and ground pin on the appliance outlet connectors. The ground resistance must be less than 0.1 Ohms.
3. If an approved medical device has been connected to the outlet of the device, measure the resistance between the ground pin on the line cord plug and identified ground test point of the approved medical device (see device's manual). The ground resistance must be less than 0.2 Ohms.

#### 3.7.2 Earth Leakage and Chassis Leakage Current

**Note:** Wait 30 seconds after powering on before taking readings to ensure device has completed all self-tests and all power relays are closed.

For 100 VAC and 115 VAC rated devices:

In normal condition and in all possible operating modes the leakage current shall be less than 300 microamperes.

If required by local ordinances, in single fault condition and in all possible operating modes the leakage current shall be less than 500 microamperes.

For 220-230-240 VAC rated devices:

In normal condition and in all possible operating modes the leakage current shall be less than 500 microamperes.

If required by local ordinances, in single fault condition and in all possible operating modes the leakage current shall be less than 1000 microamperes.

#### 3.7.3 Leakage Current

Isolation of the applied parts is performed by insulation in the patient temperature probe and the in-bed scale. If so desired, the patient temperature probe can be tested by wrapping in foil or submerging in normal saline 6 inches (15 cm) of the part of the probe that attaches to the patient. Measurements shall be taken from the conducting medium. If present, the in-bed scale can be tested by connection to the top tray mount screws.

**Note:** Wait 30 seconds after powering on before taking readings to ensure device has completed all self-tests and all power relays are closed.

For AC lead leakage current:

In normal condition in all possible operating modes the patient lead leakage current shall be less than 100 microamperes.



If required by local ordinances, in single fault condition in all possible operating modes the patient leakage current shall be less than 500 microamperes.

For DC lead leakage current:

In normal condition in all possible operating modes the patient lead leakage current shall be less than 10 microamperes.

If required by local ordinances, in single fault conditions in all possible operating modes the patient lead leakage current shall be less than 50 microamperes.

### 3.8 Line Voltage Calibration

**Note:** It is not necessary to perform the Line Voltage Calibration if System Calibration has already been performed.

**Important:** Be sure to perform line voltage calibration after replacing a relay board.

1. Access service Mode. (See “Understanding the Service Interface Layout” on page 4-3.)
2. Touch **Calibration** in the left-navigation area. The display area is populated with calibration options.
3. Touch **Cal Line Volt**.

The Calibration Line Voltages screen appears

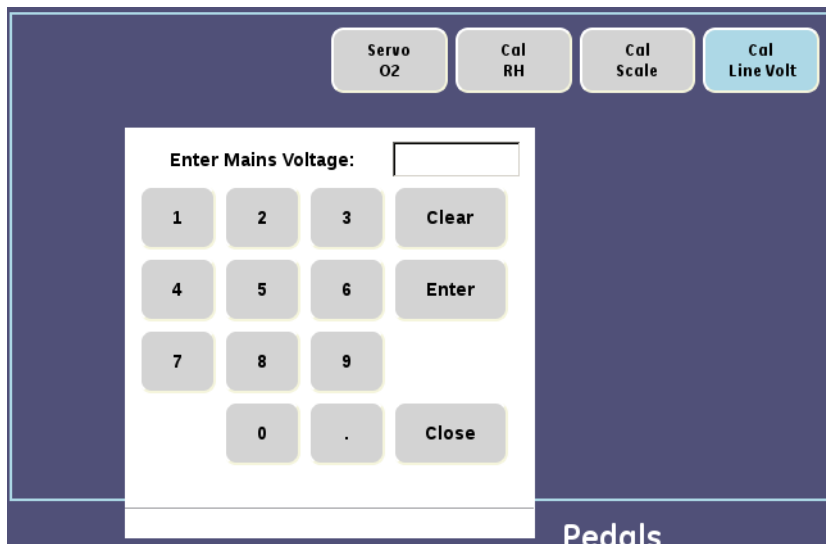


FIGURE 3-10. Cal Line Volt

4. Measure the line voltage at the AC connectors located at the bottom of the electrical enclosure.
5. Use the keypad to enter the desired values. Touch clear to clear the currently typed values.
6. Touch **Enter**. Wait for calibration to finish. To exit the calibration window touch **Close**. When calibration is completed, the screen will say Mains Voltage Calibration Complete. If the message “Mains voltage calibration failed. Please enter the mains voltage again” appears this indicates the dialed in line voltage is 20% different than the measured value (not the nominal value).

If the message “Mains voltage calibration failed. Please enter the mains voltage again” appears this indicates the dialed in line voltage is 20% different than the measured value (not the nominal value).



# Chapter 4: Understanding the Service Interface

## 4.1 Powering the Device

This section describes how to turn the device On and Off.

Isolation of the device from the supply mains can only be achieved by turning off the device using the mains power switch on the rear of the device. The standby switch on the probe panel will not isolate the device from the supply mains.

To turn the device On:

1. Plug the power cord into a grounded outlet or, where available, a hospital grade outlet.

**Note:** If the device has not been unplugged, verify that the device is plugged in and that the Mains power switch is turned On.

2. Turn on power at the Mains power switch on the back of the device.
3. Turn on the power at the Standby switch on the probe panel.

When power is applied, the indicator light and Power Fail Indicator Light briefly turn on and then off. A series of informational screens are displayed.

The device is ready for use when the Home screen appears.

To turn the device Off:

1. Turn off the power at the Standby switch.
2. If the device will be moved, turn off the Mains power switch at the back of the device, unplug the device, and wrap the cord for safe transport.
3. If the device will not be moved, no other action is needed for powering on or off.

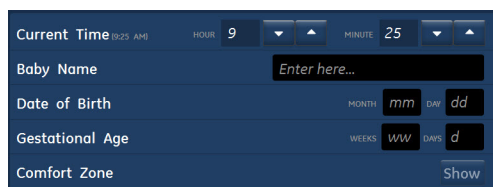
## 4.2 Accessing Service Mode

By default, the device starts up in user mode. A series of user-hidden actions allows service personnel to access Service Mode.

To access service mode:

1. In user mode, touch **Setup** on the Home screen.

The Setup screen appears.



The screenshot shows a dark blue user setup screen. At the top, it displays 'Current Time' with a sub-label '(9:25 AM)'. Below this are two rows of controls: 'HOUR' with the value '9' and 'MINUTE' with the value '25', each with up and down arrow buttons. The main content area consists of four rows of input fields: 'Baby Name' with a text input field containing 'Enter here...'; 'Date of Birth' with 'MONTH' (mm) and 'DAY' (dd) dropdowns; 'Gestational Age' with 'WEEKS' (WW) and 'DAYS' (d) dropdowns; and 'Comfort Zone' with a 'Show' button. A blue arrow points to the 'Baby Name' input field.

FIGURE 4-1. User Setup Screen

2. Touch the data Baby Name field **Enter here**.  
The keyboard appears.

### Accessing Service Mode

3. If this is the first time accessing the application, enter **Pass0000** and go to step 6. If not enter your password (Pass + PIN). The password is not case sensitive and may be typed in upper or lower case.  
**Note:** If this is the first time you are accessing the application, you have the option to change your password as described in "Change Password" on page 4-2.
4. Wait for Password Verified to display.
5. Turn off the Standby switch to turn off the device.
6. Turn on the Standby switch within one minute to turn on the device.  
The device restarts in Service Mode and is open to the Setup screen.

#### 4.2.1 Change Password

You have the option to change your password upon initial access to the Service application. You may also change it at any time.

To change your password:

1. Access service mode.
2. Touch **Reset Password**.
3. Enter a 4 digit personal identification number (PIN) on the keypad.
4. Reenter the PIN.
5. Touch **Yes** to set the new password and **No** to cancel.

**Note:** The new password (not case sensitive) is Pass + your 4 digit PIN.

#### 4.2.2 Forgotten Passwords

If you forget your password, the only way to get into the service application is through hardware.

To reset a forgotten password:

1. Power off the device.
2. Remove Rear Panel Cover to access the Control Board.
3. Partially slide out the Control Board to expose the Dip Switch, S1.
4. Set Dip Switch S1 position 8 to ON.
5. Power on the device  
You are automatically placed in Service mode.
6. Touch Reset Password.
7. Set a new password.
8. Power off the device
9. Set Dip Switch S1 position 8 to OFF.
10. Slide Control Board back to original position.
11. Replace Rear Panel Cover.
12. Power on the device.  
The device starts in operator mode.

## 4.3 Understanding the Service Interface Layout

The Service Interface layout provides a consistent structure for all of the service screens. Service mode provides a touch screen interface.

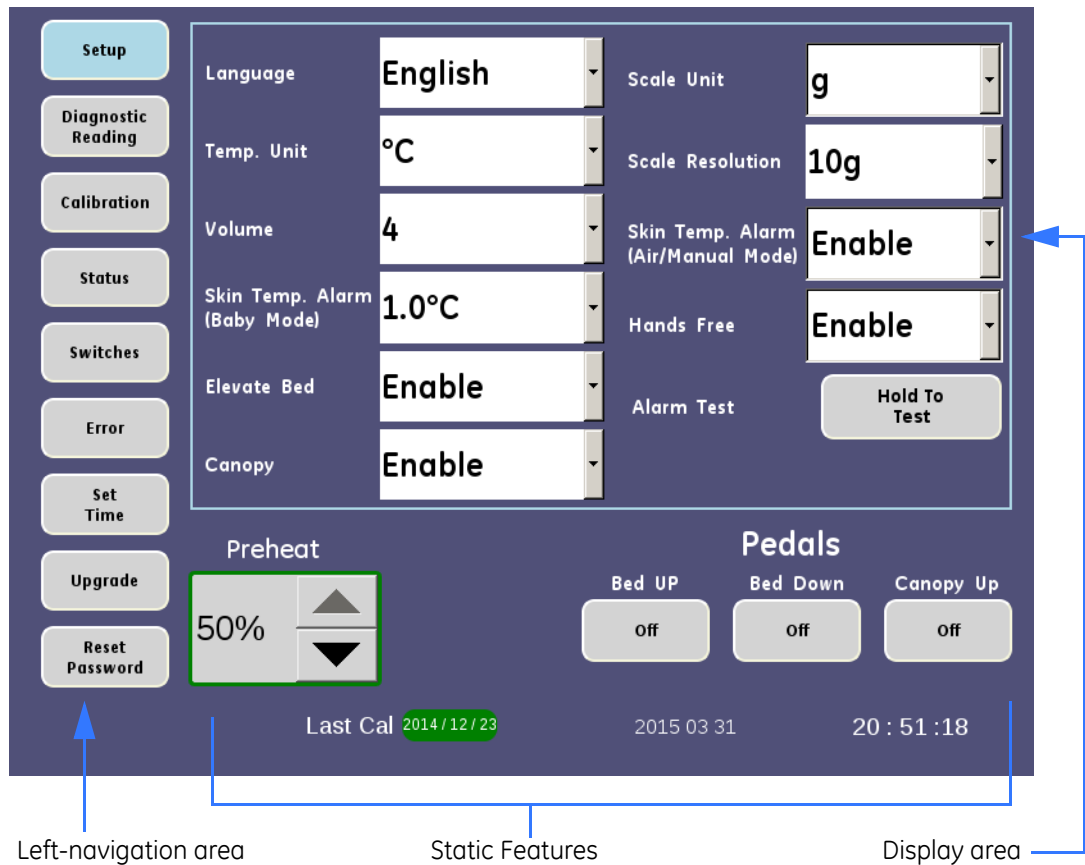


FIGURE 4-2. Service Interface Layout

Left-navigation items provide access to high-level features. When a left-navigation button is touched, the display area is populated with options or display items depending on your selection. Static features are available on each screen regardless of the left-navigation feature chosen. The default screen is the Setup screen.

**Note:** Diagnostic Readings, Status, Switches and Error sub menus and detailed instructions are covered in “Troubleshooting” on page 5-1.

## 4.4 Static Features

Static features are available on every service screen.

### 4.4.1 Preheat

The current preheat percentage is displayed. You can change the percentage in 5% increments. By touching the up or down arrow. Select from 10 to 50% radiant heater power to preheat without alarms; 25% is the default.

Setup

**Note:** Resetting maximum preheat level to above 25% will result in noncompliance to device standard IEC 60601-2-21.

4.4.2 Pedals

The Bed/Canopy can be operated from the service screen when pedals are not working by touching the On/Off toggle for each item. In the event of a bed raise/lower or canopy foot pedal switch failure, selecting pedals allows the canopy to be raised or the bed to be raised or lowered.

4.4.3 General Information

The date of last time the temperature and line voltage calibration was performed and current time settings appears across the bottom of the screen.

Last Cal: The date the System Calibration (Temperature and Line Voltage) was completed, the current date and current time.

4.5 Setup

The setup screen allows you select basic device setup options. These options determine the items visible in the user interface screens. Touch the pulldown and select the desired item.

**Note:** If the values in the service mode setup screen are changed, the values are only implemented in the main application when the patient history is cleared.

To access Setup features:

1. In service mode, touch **Setup** in the left-navigation area. The display area is populated with Setup options.

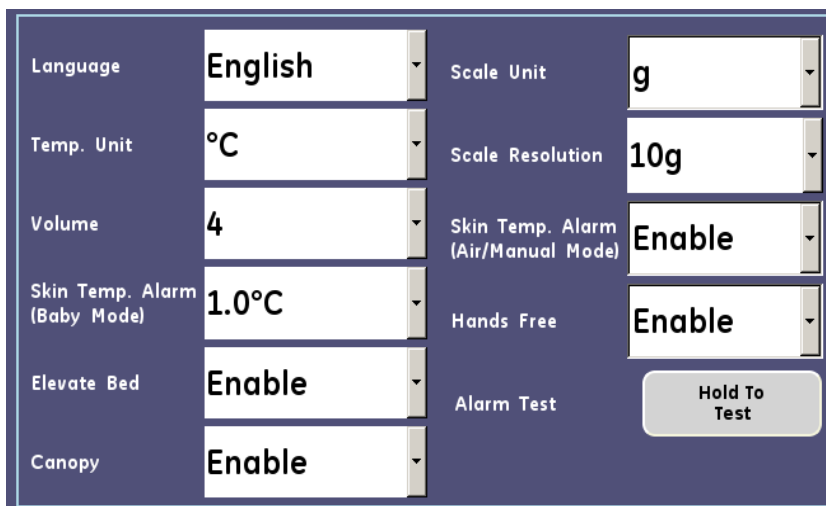


FIGURE 4-3. Setup Screen

2. Select desired settings. See the table below for detailed setting information. A prompt appears as follows: **Applying Settings: Do not turn off power.**

3. Wait for the prompt to disappear before powering off unit.

Pulldown Item	Description
Language	Selects the language to display on-screen in the user interface. English is the default language.
Temp Units	Select the temperature units displayed. °C, °F, or °C only are available. °C only prevents the Fahrenheit option from showing on the user Setup screen (Celsius is factory set default).
Volume	Select one of four alarm volume settings. 1 is minimum; 4 is maximum.
Skin Temp Alarm (Baby Mode)	Set the default Hot patient/Cold patient alarm to activate when either 0.5°C or 1.0°C difference is read between a set temperature and the patient temperature.
Elevate bed	Disable or enable the bed Raise/lower pedal switches. If the pedals are disabled on the service screen, they cannot be enabled on the user Setup screen.
Canopy	Disable or enable the canopy foot pedal switches, they cannot be enabled on the user Setup screen. <b>Note:</b> The hand switches remain active when the Canopy is disabled on the service screen.
Scale Unit	Select from Grams, Pounds, or Grams Only. Grams Only prevents the pounds option from showing on the user Scale screen. Grams is the factory default.
Scale Resolution	Select from available scale resolution settings: 10, 5, 2, or 1 gram (10 grams is the factory default).
Skin temp alarm (Air/Manual Mode)	Use to enable or disable the skin temperature alarms in the Manual Mode. If disabled on the service screen, it cannot be enabled on the user setup screen. The alarm will not activate if a patient set point has not been entered.
Hands free alarm	Select to enable or disable the Hands Free Alarm Silence.

## 4.6 Calibration

The Calibration screen allows to view status and calibrate Oxygen, humidity, scale, and line voltage.

## 4.7 Set Time

The Set Time screen allows you to set the real time clock for time, day and date.

## Upgrade

To set time and date formats:

1. In service mode, touch **Set Time** in the left-navigation area.

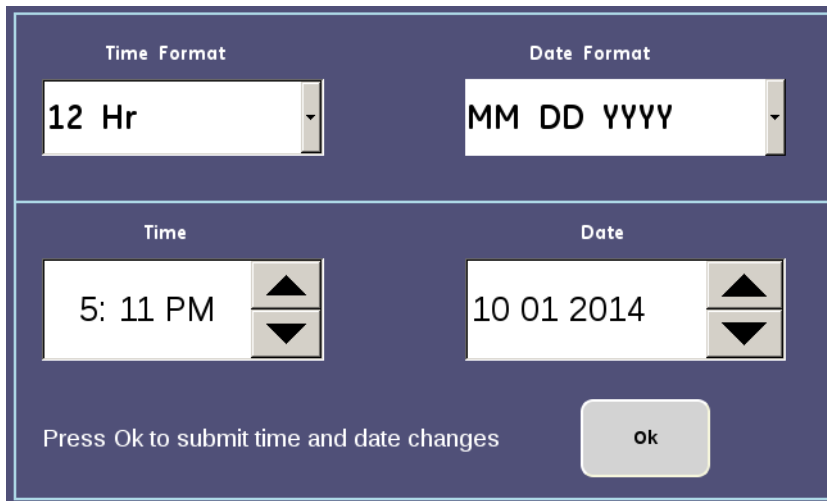


FIGURE 4-4. Set Time Screen

2. Select the desired value from the pulldowns.  
You can select the date format and time format (12 hour (AM/PM) or 24 hour).
3. Touch **OK** to accept any changes made to the time and date (not needed for the formats).

## 4.8 Upgrade

To upgrade current software:



1. In service mode, touch **Upgrade** in the left-navigation area.



FIGURE 4-5. Upgrade Screen



The USB and Ethernet connectors are identified with the electrostatic discharge sensitive label on the back of the display assembly. The connectors should not be touched, nor should any connector be plugged in until all possible electrostatic charges have been discharged by either touching the rails or other metal surface on the device.

2. Insert the USB drive with the new software into the USB Port.
3. Wait until Software Validation is complete.
4. Select **Upgrade** or **Reinstall**.  
**Upgrade** updates software components that have changed. **Reinstall** updates all software components.
5. Follow-on-screen instructions.

**Note:** Software upgrade will fail if the Alarm Board is not fully functional.



# Chapter 5: Troubleshooting

## 5.1 Troubleshooting Symptoms

*Note:* Numbers in the ID column are for reference only.

ID	Symptom	Possible Cause(s)	Action(s)
S1	User Interface Touch Screen does not function.	Foreign substance on Touch Screen surface	Turn off power. Clean and dry Touch Screen per manual. Turn on power.
		Touch Controller flex cable connection not fully seated	Disassemble Display Assembly and check flex cable connector at Touch Controller.
		Touch Controller USB cable connection not fully seated	Disassemble Display Assembly and check Touch Controller USB cable connector at Touch Controller and SBC.
		Defective Touch Controller	Replace LCD/Touch assembly.
S2	No Alarm LED Indicators at Power On	Disconnected LINCAN Cable between SBC and Alarm Board	Check for fully seated connection at SBC and Alarm Board.
		Defective LINCAN Cable	Remove/Replace LINCAN Cable.
S3	Black Display <ul style="list-style-type: none"> <li>No Alarm LED Indicators at Power On</li> <li>High Priority Audio Alarm active</li> </ul>	Display Power cable disconnected	Check for fully seated connection at SBC and power bus expansion cable.
		Defective Display Power cable	Replace cable.
S4	White Display or Distorted Display image	LCD LVDS Cable not fully seated	Disassemble Display Assembly and check LVDS cable connector at LCD and SBC.
		Defective LCD LVDS cable	Replace LCD/Touch assembly.
		Defective LCD	Replace LCD/Touch assembly.
		Defective SBC	Replace Board.
S5	Black or Dim Display	LCD Backlight Cable not fully seated	Disassemble Display Assembly and check LCD backlight cable connector at LCD and SBC.
		Defective LCD Backlight cable	Replace LCD/Touch assembly.
		Defective LCD	Replace LCD/Touch assembly.
		Defective SBC	Replace Board.

## Troubleshooting Symptoms

ID	Symptom	Possible Cause(s)	Action(s)
S6	No Power Fail Indicator (Red LED)	Display Power cable disconnected	Check for fully seated connection at SBC and power bus expansion cable.
		Defective Display Power cable	Replace cable.
		Defective Alarm Board	Replace board.
S7	No HFAS Indicator (Green LED)	Defective Alarm Board	Replace board.
S8	Hands Free Alarm Silence does not work	Too much ambient sunlight	Move device away from direct sunlight.
		Defective Alarm Board	Replace board.
		Defective LINCAN Cable	Remove/Replace LINCAN Cable.
S9	No Red Alarm Indicators	Defective Alarm Board	Replace board.
S10	No Yellow Alarm Indicators	Defective Alarm Board	Replace board.
S11	No White Alarm Indicators	Defective Alarm Board	Replace board.
S12	Device will not turn on (Power Fail Alarm)	No AC	Check Outlet power. Check Line Cord. Check breaker switch.
		No 12V DC Power	Remove main electronics rear cover. Check AC/DC Power Supply inputs and outputs.
		Defective Power Supply	Replace Power Supply.
S13	Display stuck on Giraffe logo screen <ul style="list-style-type: none"> <li>Alarm LED Indicators working at Power On</li> <li>High Priority Audio Alarm active</li> </ul>	14 pin ribbon cable disconnected	Check for fully seated connection at SBC and Control Board.
		Defective ribbon cable	Replace cable.
		Defective SBC	Replace Board.
		Defective Control Board	Replace Board.

ID	Symptom	Possible Cause(s)	Action(s)
S14	No audio alarm.	Defective speaker or harness	Use an ohmmeter to verify the speaker resistance is about 8 ohms at relay board connector J40, pins 5-6. If defective, determine whether speaker or harness is defective and take off the back cover, disconnect the lower shroud from the base plate, lean the shroud forward to access the speaker connector, and measure the resistance.
		Audio driver circuitry on control board is defective.	Replace the control board.
S15	Device equipped with servo-humidity but actual RH shows only 0.	Defective humidity sensor	Replace the humidity sensor.
		Defective control board	If problem persists, replace control board.
S16	ADD WATER message stays on even after water has been added.	Defective reservoir switch	Check resistance of reservoir switch at relay board harness J32, 2-3. Switch should be closed when reservoir is closed and open when reservoir is open.
		Defective 50 pin ribbon cable between the relay and control board.	Check for continuity on pin 6 (RHBOTTLE). If defective, replace cable.
		Defective relay board	Replace relay board.
		Defective control board	Replace control board.

## Troubleshooting Symptoms

ID	Symptom	Possible Cause(s)	Action(s)
S17	Elevating base and canopy will not go up or down.	Pedal switches are disabled on Operator Setup screen or Service screen.	Try raising/lowering canopy using the hand switches. Check Setup screen or Service screen to see if pedal switches are disabled.
		Defective toroidal transformer	Check the toroidal transformer. Refer to the Tips section (5.3.6). Replace transformer if defective.
		No mains input to the toroidal transformer	Replace relay board.
		Output voltage from the toroidal transformer is OK. Defective fuse on relay board.	Check fuses F5, F6 on the relay board.
		Defective 50 pin ribbon cable between the relay and control board	Check for continuity on pins 23, 24, 26, 27, 34 (motor control and safety relay 2 control signals). If defective, replace the cable.
		Output voltage from the toroidal transformer is OK. Fuses on relay board are OK. Defective relay board.	Replace relay board.
S18	Elevating base will not go up or down, canopy works OK.	Pedal switches are disabled on Nurse Setup screen or Service screen.	Check Operator Setup screen or Service screen to see if pedal switches are disabled.
		Defective elevating base motor.	Check the voltage to the elevating base motor. Refer to the Tips section (5.3.4). If the voltage is OK, replace the elevating base assembly.
		Defective relay board.	Replace relay board.
S19	Canopy will not go up or down with pedal switches or hand switches, elevating base works OK.	Canopy motor turns. Defective belt or clutch.	Check rail drive belt and clutch. Refer to the Tips section (5.3.5).
		Canopy motor does not turn. Defective canopy motor	Check the voltage to the canopy motor. Refer to the Tips section (5.3.4). If voltage is OK, replace the canopy motor.
		Canopy motor does not turn. Defective 50 pin ribbon cable between the relay and control board.	Check for continuity on pins 23, 24, 26, 27, 34 (motor control and safety relay 2 control signals). If defective, replace the cable.
		Canopy motor does not turn. Defective relay board.	Replace relay board.

ID	Symptom	Possible Cause(s)	Action(s)
S20	Canopy works in one direction but not the other.	Defective canopy motor.	Check the voltage to the canopy motor for both up and down movement. Refer to the Tips section (5.3.4). If OK, replace the canopy motor/gearbox.
		Defective 50 pin ribbon cable between the relay and control board.	Check for continuity on pins 23, 24, 26, 27 (motor control signals). If defective, replace the cable.
		Defective relay board.	Replace relay board.
S21	Canopy travels down part way then stops or goes very slow for the last part.	An object fell into the opening behind the radiant heater floppy door.	Check that the floppy door, located behind the radiant heater moves freely. Look to be sure nothing has fallen behind the door.
S22	Canopy travels down part way then stops and gives an in-transition alarm. Heater doors are mechanically closed, but switch status on Service screen does not indicate <i>closed</i> .	Heater door switch(es) is (are) malfunctioning.	Remove heater housing cover to access door switches. Use a small screw driver to adjust the switches so that two distinct clicks are heard when switches move. If necessary, replace switches.
		Heater door sensor wire harness (6600-0752-700) is loose or damaged.	Remove heater housing cover to access and inspect the wire harness. If necessary, reinstall and/or replace the harness. Before removing the harness, note which switch pins are connected to which harness lead for proper re-installation.
S23	Canopy rises slowly and stops before doors are opened fully.	Broken rungs in rail drive belt	Inspect belt. Refer to the Tips section (5.3.5).
S24	Canopy is clouded.	Use of alcohol or hand-disinfectants	Replace canopy.
S25	The radiant heater doors do not close completely when the canopy is lowered.	Heater door top seal or bottom seal interferes with the doors.	Move or replace the seal.
		Heater door arm on spring spool assembly is stuck.	Replace the heater door spring spool assembly.
		Heater door spring spool assembly pins are touching the heater door cable.	Straighten pins away from the spring spool and cable.

## Troubleshooting Symptoms

ID	Symptom	Possible Cause(s)	Action(s)
S26	The radiant heater doors do not open completely when the canopy is raised.	M5 nut (6600-0711-408) on spring tube assembly rod is loose or missing.	Inspect the M5 nut attachment of spring tube assembly to the bracket. If necessary: <ol style="list-style-type: none"> <li>1. Reinstall the rod in the bracket.</li> <li>2. Install the hardware and nut on the rod.</li> <li>3. Tighten the nut.</li> </ol>
		Spring tube lower (white) cap had loosened and disengaged from the spring tube.	Inspect the spring tube lower (white) cap. If necessary, reinstall the cap in the spring tube and tighten.
S27	Display is stuck on Giraffe logo screen.  The E-Base could move down, or the radiant heater could be ON, even in a closed-bed situation. The audio alarm may or may not be present.	DC power wire harness (6600-0701-700) and/or power supply DC output harness (2075837-001) is disconnected.	Confirm that the DC power wire harness and power supply DC output harness are fully connected.  <b>Caution:</b> To avoid damaging a harness, make sure you do not pull the harness by the cable wires. Instead, use the connector body to disengage or to engage the connectors.
		DC power wire harness (6600-0701-700) and/or power supply DC output harness (2075837-001) is damaged.	Refer to section <a href="#">5.2.5</a> .
S28	Device will not switch to Baby Mode.	A skin temperature probe is plugged into probe panel connector 2 on the probe panel.	Disconnect skin temperature probe from probe panel connector 2 (device will only allow Baby Mode operation with a single skin temperature probe in probe panel connector 1).
		Baby Mode is disabled on Service screen.	Select BOTH for Patient Control on Service screen to activate Baby Control.



ID	Symptom	Possible Cause(s)	Action(s)
S29	Device will not power up, alarm sounds.	Defective scale	Disconnect scale connector at probe panel. Power cycle the device. If error clears replace the scale.
		Defective scale harness	Disconnect scale harness from J7 on the control board. Power cycle the device. If error clears replace the scale harness.
		Defective Servo Oxygen board	Disconnect the RS485 harness from J8 on the Servo Oxygen board. Power cycle the device. If the error clears, replace the Servo Oxygen Board.
		Defective Servo Oxygen cable	Disconnect RS485 bus cable from J6 on the control board. Power cycle the device. If the error clears, replace the RS485 cable going to the Servo Oxygen board.
		Defective PF Battery	Remove the electrical enclosure cover and disconnect the PF Battery. Power down and power up again. If the device powers up, replace the 9V PF Battery (66600-1024-600).
		Defective power supply	Check power supply voltages. Refer to the Tips section (5.2.4).
		Defective power harness to SBC	Verify power supply voltages at J17 on SBC. <ul style="list-style-type: none"> <li>• +5V 1-2</li> <li>• +12V 1-3</li> <li>• +5STBY 1-4</li> </ul>
		Defective SBC	Disconnect ribbon cable from J6 on control board. Power up device. Giraffe logo should appear on display. After about 70 seconds the audible alarm sounds. If the logo does not appear replace the SBC.
S30	Patient Hot or patient Cold alarms activated while device is in Manual Mode.	MANUAL TEMP alarm is selected on the operator Setup screen.	Select OFF for MANUAL TEMP alarm on Setup screen.

## Troubleshooting Symptoms

ID	Symptom	Possible Cause(s)	Action(s)
S31	Air Temp >38C or Air Temp >40C alarm activated even though compartment temp is < alarm.	Alarm is not designed to automatically reset after alarm condition is resolved.	Push the operator interface alarm silence button to clear the alarm.
S32	Bed warms up very slowly, may not reach set temperature.	One of the bed heater cartridges is defective.	Feel the heat sink to see if one side is cooler than the other. Use care, since the heat sink can reach temperatures as great as 121C (250F). Replace the cartridge on the cool side.
S33	Device always powers up in Service screen mode.	Incorrect dipswitch setting	Check position 8 on the control board dipswitch. Should be set to Off position.
S34	Screen refreshes every few seconds while scale is attached.	Defective circuit on control board (Unbiased RS485 bus during idle state)	Replace control board.
		Defective scale	Disconnect scale connector at probe panel. Power cycle the device. If error clears replace the scale.
		Defective scale harness	Disconnect scale harness from J7 on the control board. Power cycle the device. If error clears replace the scale harness.
S35	Noise from speaker on power down.	Microprocessor does not hold reset during power off.	If noise is excessive, replace control board.
S36	Fan is running in high speed but no FAN ALWAYS IN HIGH SPEED message and the Air Boost is not on.	This is normal condition for 90 minutes after power up, 45 minutes after transition from open to closed bed mode, and during other conditions as determined by the heat control software.	To check HIGH and LOW fan speed, power up the device. After the power up sequence is complete, touch and activate the Air Boost icon. Touch and hold Alarm Silence for more than five (5) seconds.  The Air Boost icon will turn off and the fan switches to low fan speed. Now Air Boost function is fully operational and will toggle between high and low fan speed.  <b>Important:</b> Change in the Air Boost Icon will only change the fan speed if this procedure is followed.

ID	Symptom	Possible Cause(s)	Action(s)
S37	Bed will not lock in tilt position.	Tilt ball not engaged in finger pocket latch	Tilt the control panel end of the bed platform all the way down while holding the latch open, then let the latch close to capture the tilt ball. Make sure the ball is clear of debris.
		Tilt brake pad failure	Replace the tilt brake.
S38	Patient Cold or patient Hot Alarm does not trigger at 0.5°C or 1.0°C in Air Mode.	Manual Temp. Alarm is disabled on Service screen.	Enable Manual Temp. alarm.
S39	Humidifier reservoir is crazed (has hairline cracks).	Sterilization	Replace humidifier reservoir.
S40	Humidifier reservoir has scaling.	Use of tap water	Replace humidifier reservoir.

## 5.2 Additional Troubleshooting Tips

Following are tips on taking many of the measurements and diagnosing the failures that are referred to in the troubleshooting charts. The board revision code is located in a triangle printed on the component side of the PCB. Refer to relay board [Figure 8-41](#).

### 5.2.1 Raising and Lowering the Canopy or Elevating Base

In the event of an system failure, it may be possible to raise or lower the canopy or the elevating base in the Service Mode. Access the Service screen. The pedals are now activated to assist in troubleshooting or transport.

### 5.2.2 Incubator Heaters and Bed Safety Thermostat

There are two 115 volt incubator heaters rated at 225 watts at 104 volts, which are mounted at opposite ends of the incubator heat sink. They are always connected in parallel and are powered by isolated 115 volts from the heater isolation transformer. This voltage is switched by the incubator SSR.

The resistance of each heater is about 48 ohms and they are in parallel so you should measure about 24 ohms. Note that the bed safety thermostat is in series with the heaters so if the reading is open circuit you must take readings at the connectors under the bed to determine which is defective.

To measure the incubator heater resistance, disconnect the black wire on the incubator SSR and the connector from J54 on the relay board. Measure between harness connector pin 4, and the black wire.

The incubator heater and bed safety thermostat resistance can also be measured by the removing the bottom cover and measuring directly at the components.

### 5.2.3 Radiant Heater

The 115 volt radiant heater is rated at 225 watts at 104 volts. It is powered by isolated 115 volts from the heater isolation transformer switched by the radiant warmer SSR.

The resistance of the radiant heater is about 24 ohms.

To measure the radiant heater resistance on devices, disconnect the brown wire on the radiant heater SSR and the connector from J54 on the relay board. Measure between harness connector pin 3, and the brown wire.

The radiant heater resistance can also be measured by removing the heater housing and measuring on the radiant heater harness.

### 5.2.4 Power Supplies



**Caution:** To avoid damaging a harness, make sure you do not pull the harness by the cable wires. Instead, use the connector body to disengage or to engage the connectors.

The 5V and 12V supplies are generated on the power supply.

+5VSTBY is generated on the relay board. These voltages are distributed to the control board, SBC, servo oxygen board, and expansion slots through a harness with a series of 4 pin connectors. The easiest place to measure the power supplies is at one of the spare 4 pin connectors on this power bus.

Signal	Location	Wire Color	Value
+5V	J42 pins 1-2	Orange and blue	4.75 to 5.25
+5VSTBY	J42 pins 1-4	Orange and green	4.75 to 5.25
+12V	J42 pins 1-3	Orange and red	10.8 To 13.2

The 5VSTBY should also be present during power fail.

+5VAN and -5VAN are generated on the control board and are only used on the control board. They can be measured on the test points on the control board.

Signal	Location	Value
+5V	TP2 pins 1-4	4.75 to 5.25
+5VSTBY	TP2 pins 3-4	4.75 to 5.25
+5AN	TP1 pins 5-6	4.75 To 5.25
-5AN	TP1 pins 4-6	-4.0 To -5.5

The 5V and 12V supplies are generated by the Power Supply and are sent to the Relay Board for distribution. The +5STBY is generated on the Relay Board from either the 12V (normal operation) or the 8.4V NiMH PF Battery (power fail). These 3 voltages are distributed to the other boards via various cables.

Board	Cable
Control Board	Expansion Slot Power Bus (6600-0701-700) from Relay Board
Servo Oxygen Board	Expansion Slot Power Bus (6600-0701-700) from Relay Board
RS-232 Board	RS-232 Cable (2074735-001) from Control Board
ICSBC	Rail Power Cable (6600-0706-700) from Expansion Slot Power Bus
Alarm Board	LINCAN Cable (2069666-001) from ICSBC

The easiest place to measure a power supply voltage is at one of the spare 4 pin connectors on the Expansion Slot Power Bus.

### 5.2.5 Troubleshooting Harness Cables 6600-0701-700 and 2075837-001

If DC power wire harness (6600-0701-700) or power supply DC output harness (2075837-001) is disconnected or damaged, perform the following steps.

1. Open the electronics enclosure on the back of the incubator and pull the control board out until you expose the power connector (it is the 4-wire cable in the middle of the control board). See Figure 5-6.

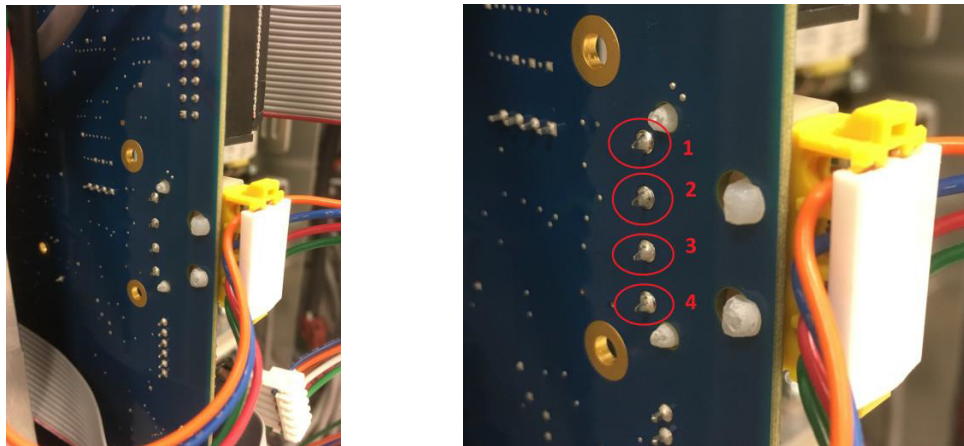


FIGURE 5-6. Exposing the Power Connector

2. Use a digital multimeter to measure the voltages between pin 1 and pins 2, 3 and 4, respectively.
 

**Note:** Pin 1 is ground and is the top-most pin.

  - a. Connect the negative (com) probe of multimeter to pin 1 and the positive probe to pin 2. The voltage shall be more than 4.75V. If not, either harness 6600-0701-700 or harness 2075837-001 is defective. Order new harnesses and replace them both.
  - b. Connect the negative (com) probe of multimeter to pin 1 and the positive probe to pin 3. The voltage shall be more than 11.5V. If not, either harness 6600-0701-700 or harness 2075837-001 is defective. Order new harnesses and replace them both.

Switches/Thermostat

- c. Connect the negative (com) probe of multimeter to pin 1 and the positive probe to pin 4. The voltage shall be more than 4.75V. If not, harness 6600-0701-700 is defective. Order a new harness and replace it.

**Note:** When replacing either harness, do not to pull by the cable wires, but use the connector body to disengage or engage connectors.

**Note:** If the voltages on pins 2, 3, 4 are all within the acceptable voltage range, then both harnesses are good to use and the symptom is not related to harness damage.

### 5.3 Switches/Thermostat

Use switch status diagram on the Switches service screen to assist in troubleshooting the switches.

Canopy up detect	Relay bd J36 pins 1-2	Closed when canopy is up
Canopy down detect	Relay bd J36 pins 7-8	Closed when canopy is down
Canopy middle	Relay bd J36 pins 4-5	Closed momentarily during transition
Heater doors open	Relay bd J31 pins 2-3	Closed when both heater doors are open
Heater doors closed	Relay bd J31 pins 1-3	Closed when both heater doors are closed
Humidity reservoir	Relay bd J32 pins 2-3	Closed when reservoir is closed
Add water thermostat	Relay bd J32 pins 1-3	Opens when reservoir needs water

Canopy foot control		
Left or Right	Relay bd J40 pins 3-4	Closed when either switch is pressed
Elevating Base Foot Control		
Left or right up	Relay bd J40 pins 2-4	Closed when either switch is pressed
Left or right down	Relay bd J40 pins 1-4	Closed when either switch is pressed

When closed the resistance should be less than 200 ohms.

Canopy hand control		
Left up	Relay bd J35 pins 2-4	Closed when switch is pressed
Left down	Relay bd J35 pins 3-4	Closed when switch is pressed
Right up	Relay bd J35 pins 6-5	Closed when switch is pressed
Right down	Relay bd J35 pins 7-5	Closed when switch is pressed

### 5.3.1 Humidifier Heater/Safety Thermostat

The humidifier has two separate heater elements rated at 225 watts at 104 volts. They are connected in parallel for 115 volt operation and in series for 230 volt operation. The humidifier safety thermostat is in series with the heater. It opens at 130 +/-5 C and closes at 90 +/-8 C. Measure the resistance at J53.1 to J53.3.

The resistance of each heater is about 144 ohms so it should measure about 72 ohms for 115 devices, 288 ohms for 230 devices.

### 5.3.2 Compartment Air Probe and Skin Temperature Probes

Use the Service screen to read the temperature of the compartment and skin temperature probes.

There are two thermistors in each air probe or skin temperature probe. During stable temperature conditions the thermistors should read the same resistance within a few ohms.

Skin temperature probe #1	Control bd J4 pins 1-3, 2-3
Skin temperature probe #2	Control bd J2 pins 1-3, 2-3
Compartment Air probe	Control bd J1 pins 1-2, 3-4

Temperature (°C)	Resistance (Ohms)
20	12527
25	10000
30	8037
35	6500

See "Compartment and Skin Probe Characteristics" on page A-1 for complete temperature/resistance tables.

### 5.3.3 Heat Sink Sensor Thermistor

Use the Service screen to read the resistance of the heat sink sensor.

Thermistor	Control bd J3 pins 1-2
------------	------------------------

Temperature (°C)	Resistance (Ohms)
20	25000
25	20000
30	16102
35	13048
40	10636
80	2506
90	1827

Temperature (°C)	Resistance (Ohms)
100	1353
110	1017
120	775

### 5.3.4 Elevating Base Motor and Canopy Motor

If you must replace a footswitch when the bed is all the way down, use Pedal screen on Service screen to raise or lower the bed.

To troubleshoot a broken canopy roll pin, run the elevating base all the way up. Take the bottom end cap off the rail and the back panel off the electrical enclosure. Use a flash light to look up into the rail and see what moves when the canopy slips. If the motor coupler is turning, then one of the roll pins is missing or broken.

The elevating base motor and canopy motors are driven by the same circuits. The elevating base is always driven at 24 volts DC (acceptable range 24-32), and the canopy motor is driven at 24 volts (acceptable range 24-32) when going up and 12 volts (acceptable range 12-16) when going down.

The following chart shows the control signal values and the output voltages for each of the motor conditions.

Switch	Control Signals, Relay Board				Elevating Base	
	J37 pin 23 24V SELECT	J37 pin 26 E/H ACTIVATE	J37 pin 24 NVERTPOLARITY	J37 pin 27 E/H SELECT	J45-1	J45-2
Raise E-base	0	0	1	0	+24V	Gnd
Lower E-base	0	0	0	0	Gnd	+24V
None	NA	1	NA	NA	NA	NA

Switch	Control Signals, Relay Board				Canopy	
	J37 pin 23 24V SELECT	J37 pin 26 E/H ACTIVATE	J37 pin 24 NVERTPOLARITY	J37 pin 27 E/H SELECT	J46-1	J46-3
Raise canopy	0	0	1	1	+24V	Gnd
Lower canopy	1	0	0	1	Gnd	+12V
None	NA	1	NA	NA	NA	NA

### 5.3.5 Troubleshooting the 50 Pin Ribbon Cable

All of the communication between the control and relay boards passes through the 50 pin ribbon cable. Many of the troubleshooting procedures in this manual recommend that you verify continuity for specific



pins in the cable. Because it is difficult to remove and measure the cable without possibly changing the resistance, it is suggested that you keep a spare 50 pin ribbon cable to use as a troubleshooting tool.

### 5.3.6 Troubleshooting the Toroidal Transformer

Perform the following tests in service mode. The referenced voltages should always be present when the device is in service Mode. In normal operating mode, the voltages are not present if safety relay 2 contacts are open.

1. Check the output voltage of the toroidal transformer at J44 pins 1-2 and at J44 pins 3-4. Voltages should be about 15 volts AC.
2. If the voltage is not present verify that mains voltage is present at the primary input to the toroidal transformer in service Mode. This voltage can be measured at relay board connector J51 pins 1-2. It can also be measured at the configuration plug on the toroidal transformer pins 1-4.
3. If the primary voltage is present and there is no output voltage, the toroidal transformer is defective.
4. If the primary voltage is not present, then replace the relay board.

## 5.4 Servo Controlled Oxygen

### 5.4.1 Status

Access the Status screen from the main service menu. See "Accessing Service Mode" on page 4-1.

The Servo O2 screen provides status information about Oxygen as well as the mechanism to calculate oxygen.

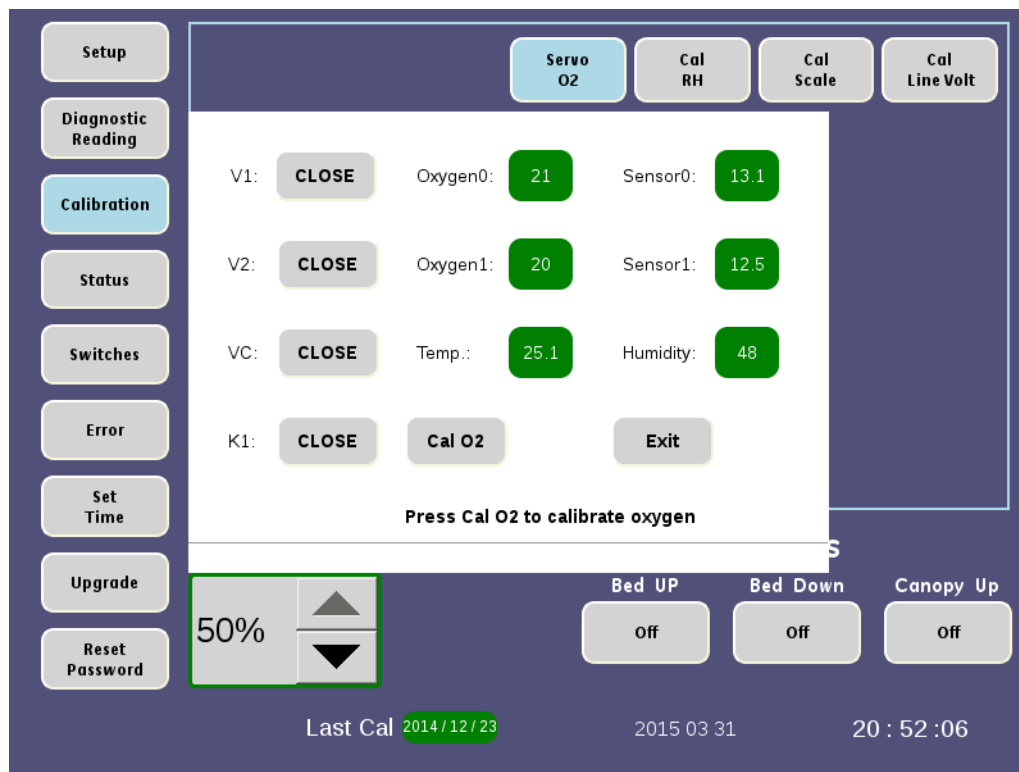


FIGURE 5-1. Servo O2

Item	Description
Oxygen0	Oxygen reading in percent from first sensor cell:
Oxygen1	Oxygen reading in percent from second sensor cell:
Sensor0	Voltage output in millivolts from first sensor cell.
Sensor1	Voltage output in millivolts from second sensor cell. <b>Note:</b> The following information applies to the oxygen0, oxygen1, sensor0, and sensor1 values: <ul style="list-style-type: none"> <li>5 - 90 mv = 21 - 100% O2.</li> </ul>
Temp	Temperature in degrees Celsius read from a sensor inside the sensor housing located beneath the bed. Refer to temperature to resistance curve in the Tips section (5.4.4).
Humidity	Relative humidity in percent read from a sensor inside the sensor housing located beneath the bed.

## 5.4.2 Components Control

To open and close oxygen-related items on the Servo O2 information screen:

1. In service Mode, touch **Calibration** in the left-navigation area.  
The display area is populated with calibration options.
2. Touch **Servo O2**.  
The Servo O2 information screen appears.
3. Touch **V1** to open or close supply valve one in the valve housing located beneath the electrical enclosure.
4. Touch **V2** to open or close supply valve two in the valve housing located beneath the electrical enclosure.
5. Touch **VC** to open or close calibration valve in the sensor housing located beneath the bed. Open is calibration position and closed is the normal operation position. The calibration fan is on and the cooling fan is off when VC is open.

**Note:** The cooling fan is on whenever the Servo Controlled Oxygen service screen is selected and VC is closed.

6. Touch **K1** to open or close the relay on Relay PCB that powers the valves.

## 5.4.3 Servo Controlled Oxygen Alarm Messages

Alarm Message	Meaning	Cause	Action
Low Oxygen	Sensor1 reading is >3% below the oxygen set point 7 minutes after a set point change or the canopy was closed.	Low O2 supply pressure or flow Inlet screen occluded	Be sure supply is greater than 45 psi (310 kPa) and flow rate is greater than 45 L/min. If flow rate is <45 check that the inlet screen in the regulator is not occluded. Clean or replace screen.
		Air leaks into patient compartment.	Be sure all panels and portholes are closed.
		Supply Valve not opening	Check supply valves. Refer to the Tips section (5.4.4).
		End cap safety valve not opening	Check valve and spring assembly. Refer to the Tips section (5.4.4).
		Calibration valve not closing	Check the calibration valve. Refer to the Tips section (5.4.4).
		Patient compartment vents occluded	Check to be sure that the two vents in the patient compartment under the bed are not occluded.
High Oxygen	Sensor1 reading more than 3% above set point	Oxygen set point recently lowered	Allow time for oxygen level to drop.
		Supply valve(s) not closing	Check supply valves and kinked hoses. Refer to the Tips section (5.4.4).

## Servo Controlled Oxygen

Alarm Message	Meaning	Cause	Action
Oxygen Probe Failure	One of the sensors is reading out of range (23-280 millivolts) or the difference between the two O2 sensors is above 3%.	Defective Sensor(s)	In service mode sensor0 and sensor1 should be 23-280. If outside this range replace the sensors. If in range ensure oxygen0 and oxygen1 read within 3% of each other or replace the sensors.
		Leak or occlusion in sensor housing area	Be sure sensor housing is seated properly and the retaining screws are tight. Be sure sensor gaskets are in place and the tubing is seated correctly in the connectors. Check to be sure that the two vents in the patient compartment under the bed are not occluded.
		Defective cable or connection	Measure the voltage at J85.8-J85.7(sensor0) and J85.6-J85.7(sensor1) and compare them to displayed sensor0 and sensor1. If the measurement is the same as the displayed, check the cable and sensor contacts.
		Defective Servo O2 board	If the measurement is not the same as the displayed, replace the Servo O2 board.
O2 Cal Lost-No O2	Servo oxygen has never been calibrated. Servo oxygen will not operate until initial calibration is performed.	Perform oxygen calibration.	Run calibration.

Alarm Message	Meaning	Cause	Action
Oxygen System Failure 1	The sensor plug thermistor temperature reading is out of the range: 15C-55C.	Device is cold: <15 degrees C.	Allow device to warm up.
		Cooling fan is not running when the sensor housing temperature gets above 50 degrees.	Test the cooling fan. Refer to the Tips section (5.4.4).
		Defective sensor plug thermistor or cable	Disconnect the cable and measure the resistance of the thermistor between J85.4 and J85.5. Refer to R/T chart (the temperature to resistance curve) in the Tips section (5.4.4). If sensor is shorted, open, or values don't agree with the R/T chart, replace the sensor plug assembly or the cable.
		Defective servo O2 board	If resistance is in range replace the servo O2 board.
Oxygen System Failure 2	The RH reading is out of valid range: 1-99. When out of range it displays 0 in service Mode.	Defective sensor plug	Measure the humidity sensor voltage between J85.2 and J85.1. If the voltage is outside the range of 0.7V- 4.0V, replace the sensor plug assembly.
		Defective servo O2 board	If it is in the correct range, replace the servo O2 Board.
Oxygen System Failure 3	The checksum test performed during power up testing failed.	Defective Microcontroller	Replace microcontroller U6 on the Servo O2 board.
Oxygen System Failure 4	Analog to digital converter circuit self test failed. The reading of Vtest is out of the valid range:1.216V-1.254V.	Defective Servo O2 board	Replace servo O2 board.
Check O2 supply	After calibration, both supply valves are opened and after approximately 20 seconds, sensor1 reading is not greater than 23%.	O2 supply not connected	Verify O2 supply, minimum 45psi (310kPa) is connected to the inlet.
		Kinked hoses in sensor housing	Check hoses.

## Servo Controlled Oxygen

Alarm Message	Meaning	Cause	Action
Oxygen System Failure 5	Check O2 Supply alarm has been silenced twice and the sensor1 reading is still not greater than 23%.	O2 supply not connected	Verify O2 supply, minimum 45psi (310 kPa) and 45 L/min is connected to the inlet.
		Calibration valve stuck in calibration position	Check the calibration valve. Refer to the Tips section (5.4.4).
		Supply valves not opening	Check supply valves. Refer to the Tips section (5.4.4).
		Leak or occlusion in sensor housing area	Be sure sensor housing is seated properly and the retaining screws are tight. Be sure sensor gaskets are in place and the tubing is seated correctly in the connectors. Check to be sure that the two vents in the patient compartment under the bed are not occluded.
Oxygen System Failure 6	The Giraffe control board cannot communicate with Servo O2 board.	Defective Servo O2 board	Replace servo O2 board.
		Defective Cable	Check that the cable between the Giraffe control board and the Servo O2 board is seated properly.
Oxygen System Failure 7	Power up test detected a problem with the watchdog circuit.	Defective Servo O2 board	Replace Servo O2 board.
Calibration failed	In calibration mode, after 5 minutes, both sensors are not reading between 23 and 55 millivolts so the device cannot calibrate.	Calibration valve is not opening or the calibration fan is not turning on.	Check the calibration valve and fan. Refer to the Tips section (5.4.4).
		Defective sensors	Replace the sensors.
FiO2>26%	Elevated oxygen levels in patient compartment not controlled by the servo O2 system.	Auxiliary source of oxygen supply in patient compartment	Check the secondary sources, such as ventilator or resuscitation bag.
		Leak in the servoO2 system supply valve	Check supply valves. Refer to the Tips section (5.4.4).

**SENSITIVE TO ELECTROSTATIC DISCHARGE CAUTION**

An Electrostatic Discharge (ESD) Susceptibility symbol is displayed to alert service personnel that the part(s) are sensitive to electrostatic discharge and that static control procedures must be used to prevent damage to the equipment.

## 5.4.4 Servo Controlled Oxygen Troubleshooting Tips



### 5.4.4.1 Check Supply Valves and End Cap Safety Valve

Power up device in service Mode. Close the canopy. Select Servo O2. Be sure O2 is connected. Open V1. You should hear gas flow. Close V1, open V2. You should hear gas flow. Close V2, gas flow should stop. If supply valves are open and there is no gas flow, check that the end cap safety valve located in the bottom of the rail is not stuck in the closed position. Check that the two-way valve is not occluded or the spring assembly has not failed.

If both valves are not opening, test the fuses and supply valves. Disconnect J83 at the Servo O2 board. Measure the resistance on harness pin 1 to pin 2. It should be the supply valve resistance (50 to 100 ohms). If not, the fuse is opened or the supply valve is defective. Repeat for the second supply valve with pins 3 to 4. If the valves check OK, the Servo O2 board is defective.

**Note:** With one supply valve open the flow rate should be a minimum of 35 L/min. With both supply valves open, the minimum flow rate should be 40 L/min. If the flow rate is low, check that the regulator inlet screen is not occluded.



### 5.4.4.2 Check Calibration Valve/Calibration Fan

The calibration valve is located beneath the chassis in the sensor housing. The calibration fan is mounted in the sensor housing next to the calibration valve. Power up device in service Mode. Select Servo O2 . Open VC. This should open the calibrate valve and turn on the calibration fan. Verify the calibration fan is running. If the fan is running then the Servo O2 board is OK and the calibration valve may be defective. If the fan is not running check the control signal from the Servo O2 board to verify voltage is present when VC is opened to determine if the fan or board is defective.



### 5.4.4.3 Check Cooling Fan

The cooling fan is mounted to the sensor housing door on the chassis cover. Power up device in service Mode. Select Servo O2 on second page. The cooling fan should be running.

If fan is not running, verify 10.0 - 13.2 Volts at J86-1 to J86-2. If voltage is present, the fan is defective. If voltage is not present, the Servo O2 board is defective. Open VC, you should hear a click and the cooling fan should stop. If the fan does not stop the Servo O2 board is defective.

## Status

## 5.4.4.4 Sensor Housing Temperature Sensor Temperature to Resistance Curve

Temperature	Resistance
15 °C	15.720 kOhm
25 °C	10.000 kOhm
30 °C	8.056 kOhm
35 °C	6.530 kOhm
40 °C	5.326 kOhm
45 °C	4.369 kOhm
50 °C	3.604 kOhm
60 °C	2.491 kOhm

## 5.5 Status

Access the Status screen from the main service menu. See “Accessing Service Mode” on page 4-1.

The Status screen displays status of all self tests the software runs continuously. These include: incubator heater on (INCHTRON), warmer heater on (WRMHTRON), incubator/warmer heater off (I/WHTR OFF), humidifier heater on (RHHTR), remote monitoring data stream (RS-232LOOP), incubator fan on (FANON), and incubator fan off (FANOFF). The current software revision of the options installed on this specific device (Humidifier, Scale, SPO2, etc.) is shown.

If the RS-232 is not installed RS-232LOOP will display N/A. To test the circuit if the RS-232 is working, connect the RS-232 to a working RS-232 compatible device or short pins 2 and 3 on the 9 pin connector.

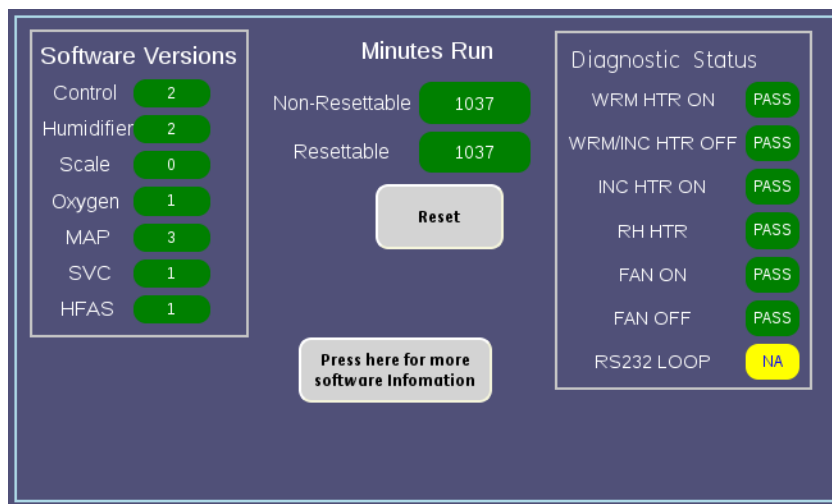


FIGURE 5-2. Status Screen



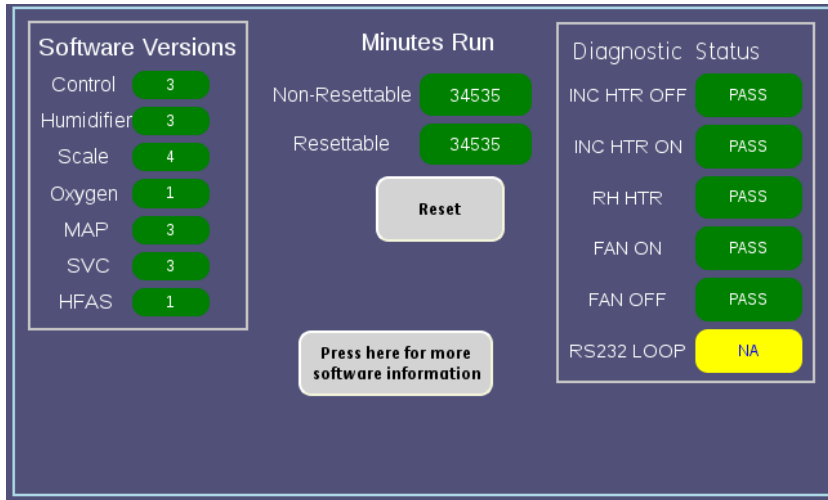


FIGURE 5-3. Status Screen

The Minutes Run area shows 2 minute parameters; one that is resettable and one that is not. To reset the resettable minute parameter, touch **Reset**.

To see additional software status information, touch **Press here for more software information**.

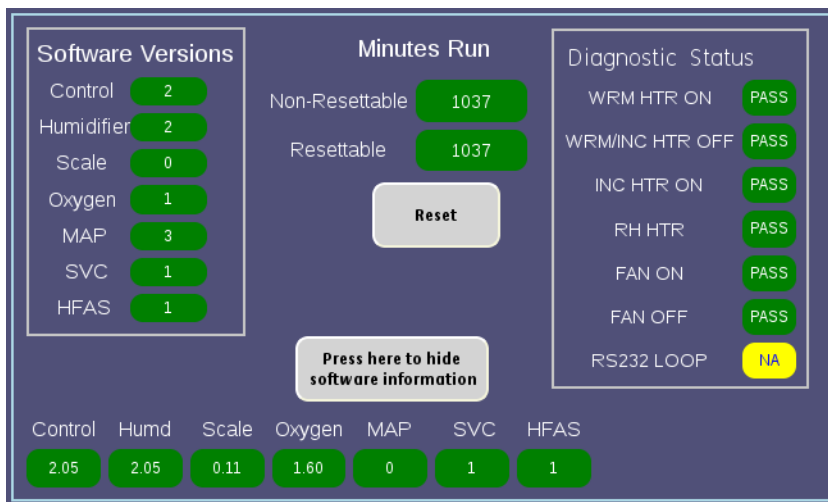


FIGURE 5-4. Status Screen

## 5.6 Switches

Access the Status screen from the main service menu. See "Accessing Service Mode" on page 4-1.

The Switches screen shows status of all the switches. If the circle next to the switch is filled in, the switch is closed; if it is not filled in, the switch is open.

Error

Diagnostic Switches	
BED UP	NO
BED DOWN	NO
CANOPY PEDAL	NO
ADD WATER	NO
HUMID ENGAGED	NO
CANOPY AT MID	NO
CANOPY AT TOP	NO
CANOPY AT BTM	YES
HTR DR. OPEN	NO
HTR DR. CLOSE	YES
CANOPY UP	NO
CANOPY DOWN	NO

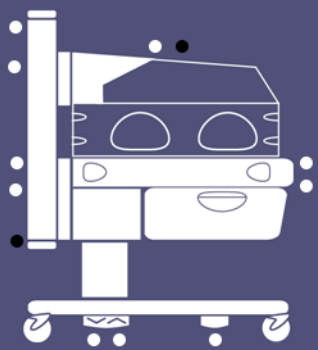
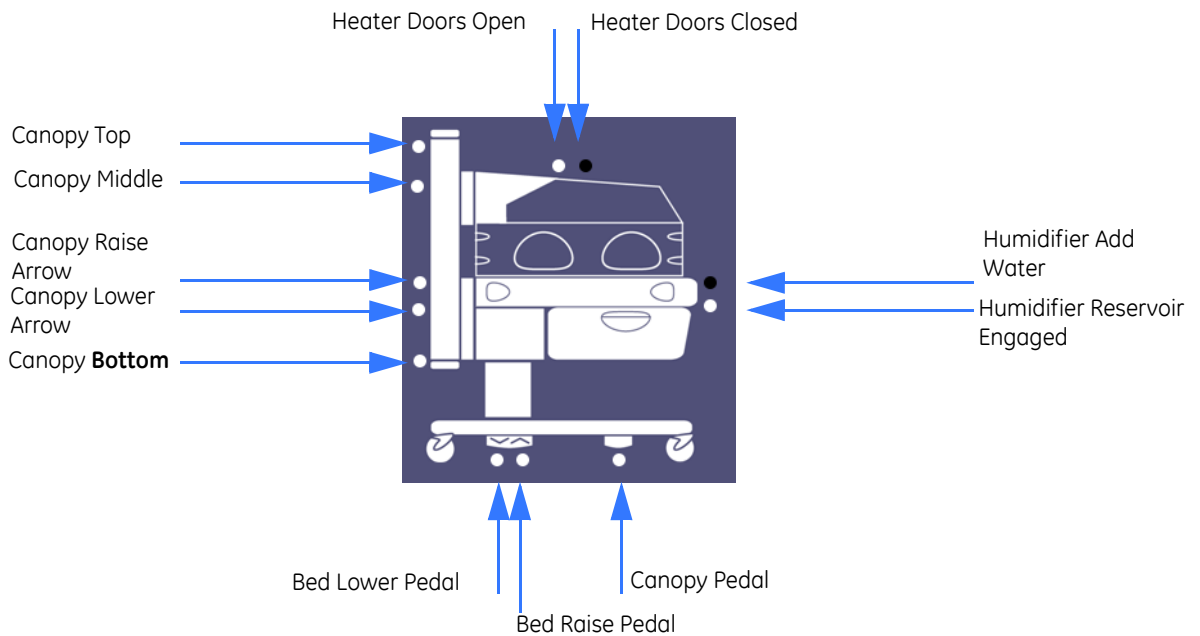



FIGURE 5-5. Switch Diagnostic Diagram

5.7 Error

Access the Status screen from the main service menu. See “Accessing Service Mode” on page 4-1.

The Error screen lists a chronological log of the last 32 system errors that occurred with error number and date.

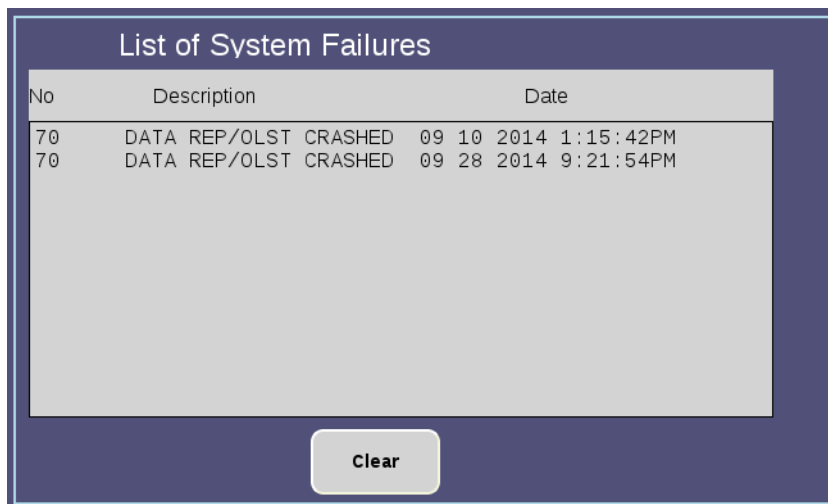


FIGURE 5-6. Error Screen

## 5.8 Alarm Test

Push and Hold the alarm test button on the Setup screen to test the functionality of the alarm light indicators, buzzer, and green power status LED on alarm board. It also tests the speakers on the Single Board Computer and device. See "Setup" on page 4-4.

**Note:** Speakers may not be installed.

## 5.9 Diagnostic Readings

The Diagnostics Readings screen provide a variety of status as well as the ability to test DAC voltage.

### 5.9.1 Status

A number of status items are available on the Diagnostic readings screen.

Diagnostic Readings



FIGURE 5-7. Diagnostic Readings Screen

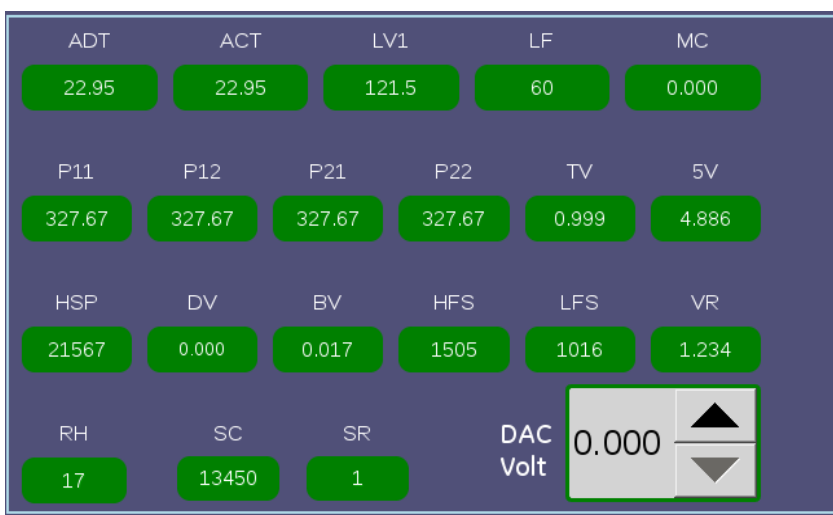


FIGURE 5-8. Diagnostic Readings Screen

5V	Power supply voltage. Should be + 0.25V of 5V.
ACT	Air Control Temperature. Temperature read by second thermistor in the compartment air probe. Should be + 0.3°C of ADT temperature.
ADT	Air display temperature. Temperature read by the first thermistor in the compartment air probe. Should be + 0.3°C of ACT temperature.
BV	Not used.
DV	DAC output voltage. It should match the DAC volt value within 10 mV.

HFS	High fan speed. Should be 1500 +/- 100 (measured at power up only).
HSP	Heat sink sensor resistance. Should be 20000 ohms @ 25°C. Refer to the Tips section (5.3.3) for resistance versus temperature values.
LF	60Hz or 50Hz.
LFS	Low fan speed. Should be 1000 +/- 100 (measured at power up only).
LV1	Line voltage in first mains circuit. Should be +/- 4V of LV2.
MC	Motor current. Shows current drawn by the canopy or elevating base motor.
P11	Reading from the first thermistor in probe panel connector1. Should be +/- 0.5°C of P12 temperature.
P12	Reading from the second thermistor in probe panel connector 1. Should be +/- 0.5°C of P11 temperature.
P21	Reading from the first thermistor in probe panel connector 2. Should be +/- 0.5°C of P22 temperature.
P22	Reading from the second thermistor in probe panel connector 2. Should be +/- 0.5°C of P21 temperature.
RH	Relative Humidity. % humidity read in the patient chamber.
SC	Scale counts corrected. (1 count = 1 gram)
SR	Scale counts raw.
TV	Thermistor voltage. Voltage of thermistor circuits located on the mother board.
VR	Voltage reference. Independent voltage reference. Should be 1.235V + 1%.

The date of last time the temperature and line voltage calibration was performed and current time settings appear across the bottom of the screen.

## 5.9.2 DAC Voltage Test

The Digital/Analog Converter voltage is the over temperature voltage that is used by the system to verify the computer independent circuitry is working. To manually test this circuit enter voltages using the arrows from 0 to .5 V.

To perform the DAC Voltage test:

1. In service Mode, touch **Diagnostic Readings** in the left-navigation area.  
The display area is populated.
2. Use the arrows to adjust the DAC Volt setting.

The DV value should match this value within 10mV.



# Chapter 6: Alarms and System Failure Codes

General user alarm descriptions are available in the User Manual. If an alarm requires interaction from service personnel, it is described in this chapter. System failure codes are described in this chapter.

## 6.1 Alarms

### 6.1.1 Compartment Sensor Failure Alarm

Cause or Circumstances	Failure	Action
The software detected a difference in the two air thermistors of > 0.5°C.	Defective compartment air probe or harness	Measure the resistance of the two sensors at the harness from control board J1, Pins 1-2, and 3-4. Under stable conditions, the resistances should be within about 100 ohms. If defective, disassemble the air probe assembly and disconnect the 5 pin connector inside. Measure resistance of the two thermistors at pins 1-2 and 3-4 to determine if the sensor or harness is defective.
Defective control board.		If the thermistors and harness measure OK, replace the control board.

### 6.1.2 Patient Probe 1 Failure or Patient Probe 2 Failure Alarm

Cause or Circumstances	Failure	Action
Probe thermistors show difference > 0.5°C.	Defective patient probe	Replace patient skin probe.
	Defective patient probe panel connector wiring	Plug patient probe into probe panel connector 1. In service Mode, note the difference between readings from P11 and P12. Plug the same probe into probe panel connector 2 and note the difference between readings from P21 and P22. If they are greater there is resistance in the probe panel connector harness. Replace the harness.

## Alarms

## 6.1.3 Patient Hot - Check Probe 1

Cause or Circumstances	Failure	Action
The Patient Hot alarm activates when the temperature measured by the skin temperature probe on the patient skin is 1.0°C above the set temperature. The alarm limit can be changed to 0.5 °C in the set-up menu. The Skin Temperature alarm must be turned on for this alarm to trigger while in Manual Mode.	Baby Mode set temperature is incorrect for patient. External heat such as phototherapy or sunlight. Skin temperature probe is disconnected from skin.	Respond per clinical protocol. Check the attachment of the skin temperature probe on the patient's skin.

## 6.1.4 Patient Cold - Check Probe 1

Cause or Circumstances	Failure	Action
The Patient Cold alarm activates when the temperature measured by the skin temperature probe on the patient skin is 1.0°C below the set temperature.  The alarm limit can be changed to 0.5 °C in the set-up menu. The Skin Temperature alarm must be turned on for this alarm to trigger while in Manual Mode.	Baby Mode set temperature is incorrect for patient. Probe disconnected from skin. The patient is cold. Skin Temperature alarm is On.	Respond per clinical protocol. If not in Baby Mode, switch to Baby Mode. Confirm Skin Temperature setting in Setup. Check the attachment of the skin temperature probe on the patient's skin.

## 6.1.5 Canopy Pedal Disabled

Cause or Circumstances	Failure	Action
The Canopy Pedal Disabled alarm activates if the pedal has been disabled on either the Service screen or the Setup screen and the pedal is pressed.	Canopy pedal is disabled in service mode. Canopy pedal is disabled in Setup screen.	Release the pedal. If the canopy pedal is disabled in the service screen and you wish to use it, contact authorized service personnel to reactivate it on the service screen.



### 6.1.6 Bed Height Pedals Disabled

Cause or Circumstances	Failure	Action
The Bed Height Pedals Disabled alarm activates if the bed raise or lower pedals have been disabled on either the Service screen or the Setup screen, and one of the pedals is pressed.	Bed pedal is disabled in service Mode. Bed pedal is disabled in Setup screen.	Release the pedal. If the canopy pedal is disabled in the service screen and you wish to use it, contact authorized service personnel to reactivate it on the service screen.

### 6.1.7 Bed Raise Pedal Pressed

Cause or Circumstances	Failure	Action
The Raise Pedal Pressed alarm activates if the pedals are pressed while turning on the device.	Pedals are pressed while turning on the device.	Release the pedal.

### 6.1.8 Bed Lower Pedal Pressed

Cause or Circumstances	Failure	Action
The Lower Pedal Pressed alarm activates if the pedals are pressed while turning on the device.	Pedals are pressed while turning on the device.	Release the pedal.

## Alarms

## 6.1.9 Bed Heater Failure Alarm

This alarm activates only when the canopy is at the bottom position.

Cause or Circumstances	Failure	Action
The software has turned on the incubator heater but it is either not turning on or the current sense circuit is not detecting that it is on.	The bed safety thermostat is open (possibly because the device was shut down when the heater was hot).	If the device was shut off when the heater was hot, allow the fan to run for several minutes to cool to below 40°C then power down and back up. If the failure still persists, continue.
	Defective incubator heater, thermostat, or wire harness	Check the resistance of the incubator heater. If defective, remove the chassis cover and measure resistance at thermostat and heaters to determine if heater, thermostat, or wire harness is defective.
	Defective incubator solid state relay (SSR)	In service mode, check the voltage across the control line of the incubator heater SSR. This control signal varies between 0 VDC and about 12 VDC.  If voltage is present replace SSR. The two SSRs are identical and can be swapped for troubleshooting. If no voltage, continue.
	Defective 50-pin ribbon cable between the relay and control board	Check for continuity on pins 36, 38, 39, and 40 (control signals). If defective, replace cable. If OK, continue.
	Defective relay board	Replace the relay board.

### 6.1.10 Bed Raise/Lower Pedal Failure Alarm

Cause or Circumstances	Failure	Action
One of the bed Raise/Lower pedal switches is shorted.	Defective bed Raise/Lower pedal switch or harness	Check the switches on the service screen to determine which switch is shorted or open. To determine if a switch is defective or the wiring has a short take off the back cover, disconnect the lower shroud from the base plate, lean the shroud forward to access the switches, and check continuity at the switch connectors. Check connections before reassembling.
Defective relay board	Defective relay board	If the alarm persists, replace the relay board.

### 6.1.11 Canopy Pedal Failure Alarm

Cause or Circumstances	Failure	Action
One of the canopy pedal switches is shorted. (The alarm appears about 100 seconds after the short.)	Defective canopy pedal switch or harness	Check the switches on the service screen to determine which is shorted. Refer to the Tips section (4.6.9). To determine if a switch is defective or the wiring has a short take off the back cover, disconnect the lower shroud from the base plate, lean the shroud forward to access the switches, and check continuity at the switch connectors. Check connections before reassembling.
One of the canopy hand switches is shorted.	Defective canopy hand switch or harness	Replace one switch. If the error persists, replace the other switch.

## Alarms

## 6.1.12 Fan Always in High Speed Alarm

Cause or Circumstances	Failure	Action
Software cannot read temperature of the heat sink sensor in incubator heat sink.	Defective heat sink sensor or harness	Check the heat sink temperature sensor resistance in service Mode. You can also check heat sink sensor resistance by disconnecting the harness from J3 at the control board. Measure between pins 1 and 2.  If defective, remove the chassis cover and disconnect the harness from heat sink sensor. Measure sensor resistance at pins 1-2 on the sensor harness to determine if sensor or harness is defective.
	Defective control board	If the heat sink sensor and harness measure OK, then replace the control board.

## 6.1.13 Fan Failure Alarm

Cause or Circumstances	Failure	Action
Fan rotation is not being detected.	Optical fan sensor not detecting the fan	<b>Note:</b> System failure 25 and FAN FAILURE are both triggered by the optical fan sensor not detecting the fan. If this occurs at power-up, a system failure 25 will activate. If it occurs after the power tests are completed, the FAN FAILURE alarm will activate.
Fan is not turning.	Fan or fan hub not seated properly	Verify the fan hub is properly seated all the way down on the fan shaft. (It may be necessary to wet the part to get it to slide all the way down on to the shaft.) Verify the fan is seated in the groove at the top of the hub.
	Defective fan motor	Replace the fan motor.
	Defective relay board	Replace the relay board.

### 6.1.14 Heater Doors Not Closed Alarm

Cause or Circumstances	Failure	Action
This alarm activates as the canopy reaches about halfway down and the heater doors are not both closed.	Doors not closing	Check to sure both heater doors are closing fully as the canopy starts to lower. If not, fix mechanical problem.
Doors are closed.	Defective switch or harness	The two heater door switches are in series. Check for continuity at J31 1-3. If defective, remove heater housing cover and check continuity at connector in switch harness pins 1-3 to determine if switches or harness in rail is defective. If continuity is good, continue.
	Defective 50 pin ribbon cable between the relay and control board	Check for continuity on pin 8. If defective, replace the cable. If good, continue.
	Defective relay board	Replace the relay board.

### 6.1.15 Heater Doors Not Open Alarm

Cause or Circumstances	Failure	Action
This alarm activates as the canopy reaches the top of its travel and the heater doors are not both open.	Doors not opening	Check to be sure both heater doors are opening fully when the canopy is all the way up. If not, fix mechanical problem. For example, adjust the spring tube position to allow full travel.
Doors are open.	Defective switch or harness	The 2 door switches are in series. Check for continuity at J31 2-3. If defective, remove heater housing cover and check continuity at connector in switch harness pins 2-3 to determine if switches or harness in rail is defective. If continuity is good, continue.
	Defective 50-pin ribbon cable between the relay and control board	Check for continuity on pin 7. If defective, replace the cable. If good, continue.
	Defective relay board	Replace the relay board.

## Alarms

## 6.1.16 Humidity Failure Alarm

**Note:** The Humidity Failure alarm can be caused by non-humidifier issues.

Cause or Circumstances	Failure	Action
The Motor Drive Failure alarm is on.	If this alarm activates, it opens safety relay 2 and disables the humidifier.	Refer to section 6.1.18 for troubleshooting.
The Elevating base does not function. If the elevating base does not function, then safety relay 2 is not being energized.	Defective 50 pin ribbon cable between the relay and control board.	Check for continuity on pin 34 (safety relay 2 control signal). If defective, replace the cable. If good, replace the relay board.
Elevating base functions.	Humidifier safety thermostat is open.	Wait for the heater to cool. Cycle power to see if alarm resets.
	Defective humidifier heater or humidifier safety thermostat.	Check safety thermostat and humidifier heater resistance.
Humidifier heater measures OK.	Relay boards rev 10 or higher.	In service Mode, verify mains voltage is present at the input to the humidifier isolation transformer. (J55 1-2)
	Relay boards rev 9 or lower. Humidifier Interface Board is mounted on relay board.	In service Mode, verify mains voltage is present at the input to the humidifier isolation transformer. (J56 1-2) J56 is on Humidifier Interface Board mounted on relay board.
No mains voltage at input to humidifier isolation transformer (J55, 1-2).	Defective fuse. Relay boards rev 10 or higher.	Check fuses F3 and F4 on the relay board. If OK, continue.
	Defective fuse. Relay boards rev 9 or lower. Humidifier Interface Board is mounted on relay board.	Check fuses on humidifier interface board.
	Defective relay board.	Replace the relay board.
The Humidity Sensor Failure alarm indicates that the humidity sensor failed and the humidifier is not operating.	Humidity sensor failed.	Replace the sensor.

## 6.1.17 In Transition - Heat Off Alarm

Cause or Circumstances	Failure	Action
As the canopy reaches the top position (for warmer mode) or the bottom position (for incubator mode), the software does not see the corresponding switch in the right rail close, to signal that the rail is at the end position.	NA	<b>Note:</b> This message should always be on when the device is in transition between the incubator and warmer modes.
<b>WARMER MODE</b> The In transition Heat Off message does not go off when canopy is all the way up.	If the alarm message Heater Doors Not Open is also displayed, troubleshoot that alarm first.	
	Defective rail drive belt	Check the belt.
	Canopy is not going high enough because spring tube in right rail is not adjusted correctly.	Try pushing up slightly on the canopy to see if the switch closes and the message goes off. If it does, adjust the spring tube position so there is less spring tension. Refer to repair procedures, section <a href="#">7.4.2</a> steps 14-15.
	Defective switch or harness	Switches can be tested in service mode. To check with an ohmmeter, disconnect harness from J36 on relay board. Measure resistance at pins 1-2. Should be open and then close when canopy reaches top of its travel. If not, either switch or harness are defective. Both are located in right rail.
<b>INCUBATOR MODE</b> In transition Heat Off message does not go off when canopy is all the way down.	Canopy is not going low enough because it needs adjustment.	Adjust the canopy as described in <a href="#">Chapter 7</a> .
	Defective switch or harness	Switches can be tested in service mode. To check with an ohmmeter, disconnect harness from J36 on relay board. Measure resistance at pins 1-2. Should be open and then close when canopy reaches top of its travel. If not, either switch or harness are defective. Both are located in right rail.

## Alarms

## 6.1.18 Motor Drive Failure Alarm

Cause or Circumstances	Failure	Action
The software has detected that the elevating base motor or the canopy motor was running when not turned on.	Defective relay board	Replace the relay board. <b>Note:</b> Humidifier will not operate during this failure.

## 6.1.19 Power Failure (LED Indicator)

Cause or Circumstances	Failure	Action
No AC power into device	On/Off switch is not turned on.	Verify cord is plugged into a live wall outlet. Verify power switch/circuit breaker on back of device is turned on.
Mains power is present but the 5V power supply is not present.	Defective fuse F1 or F2 on relay board	Check the 5 volt supply. If no 5 volts, possible defective fuses on mains to the power supply, check F1 and F2 on relay board.
	Defective power supply	Check input to power supply for mains voltage. If present and no 5 volts at output, then power supply is defective.



## 6.1.20 Radiant Heater Failure Alarm

Cause or Circumstances	Failure	Action
The software has turned on the radiant heater but it is either not turning on or the current sense circuit is not detecting that it is on.	Defective radiant heater or wire harness	Check the resistance of the radiant heater. If defective, remove heater housing cover and measure resistance at 3 pin connector on heater to determine if heater or wire harness is defective.
	Defective warmer solid state relay (SSR)	In service Mode, check the voltage across the control line of the radiant heater SSR. This control signal varies between 0 VDC and about 12 VDC.  If voltage is present, replace SSR. The two SSRs are identical and can be swapped for troubleshooting. If no voltage, continue.
	Defective 50-pin ribbon cable between the relay and control board	Check for continuity on pins 37, 38, 39, and 40 (control signals). If defective, replace cable. If OK, continue.
	Defective relay board	Replace the relay board.

## 6.1.21 Temperature Out of Calibration Alarm

Cause or Circumstances	Failure	Action
Calibration data is lost.	Defective calibration	Perform system calibration.
	Defective control board	If problem persists, replace the control board.

## System Failure Codes

## 6.1.22 Up Pedal Pressed Alarm

Cause or Circumstances	Failure	Action
The bed up pedal switch was pressed and held on during power up.	None	When the bed up pedal switch is released, the alarm deactivates. If the alarm silence button is pressed or the pedal remains on for 100 seconds, the Bed Up Pedal Failure alarm activates and the Bed Up Pedal Switches are disabled. Shut down the device and power up to clear failure.
Other	Bed up pedal switch has failed.	Refer to section <a href="#">6.1.10</a> for troubleshooting information.

## 6.1.23 Replace Clock Battery

When the clock battery voltage is too low to keep proper time, the following message appears:

Call service to replace the clock battery. Continued usage will not retain patient settings or date and time.

Cause(s)	Action(s)
Missing or bad clock battery	Replace the battery on the SBC and set proper time/date in Service Mode.

## 6.2 System Failure Codes

The following sections describe the meaning of each system failure code for the device. Each table lists the possible causes and the corresponding recommended actions, in the order in which they should be tried.

## 6.2.1 System Failure 0

System failure 0 indicates communication error between the SBC and the control board.

Cause(s)	Action(s)
Defective scale	Disconnect the scale connector at probe panel. Power cycle the device. If the error clears, replace the scale.
Defective scale harness	Disconnect the scale harness from J7 on the control board. (The scale may be plugged in.) Power cycle the device. If the error clears, replace the scale harness.
Defective Servo Oxygen board	Disconnect the RS485 harness from J8 on the Servo Oxygen board. Power cycle the device. If the error clears, replace the Servo Oxygen Board.

Cause(s)	Action(s)
Defective Servo Oxygen cable	Disconnect RS485 bus cable from J6 on the control board. Power cycle the device. If the error clears, replace the RS485 cable going to the Servo Oxygen board.
Defective PF Battery	The battery is used only for power failure. Try powering up the device with the battery disconnected. If the error clears, replace the battery.
Defective 14 pin ribbon cable between control board and SBC	Check that the 14 pin ribbon cable is properly seated at J6 on the control board and at J23 on the SBC. (Have all three parts on hand and try them one at a time. Try routing the cable around the outside of device first, then try the SBC, and then try the control board. If the error is intermittent, replace all three.)
Defective SBC	Replace SBC.
Defective control board	Replace control board.

### 6.2.2 System Failure 1

System failure 1 indicates: No Timer2.

Cause(s)	Action(s)
The Timer2 circuit of the microprocessor on the control board is defective.	Replace the control board.

### 6.2.3 System Failure 2

System failure 2 indicates: Timer2 too fast.

Cause(s)	Action(s)
Defective scale	Disconnect scale connector at probe panel. Power cycle the device. If the error clears, replace the scale.
Defective scale harness	Disconnect scale harness from J7 on the control board. Power cycle the device. If the error clears, replace the scale harness.
There is no line frequency signal to feed timer0 and timer1 of the microprocessor on the control board, or the timer2 of the microprocessor on the control board, is defective.	Power cycle the device. If system failure 8 appears, refer to the instruction in this chapter for system failure 8 (section 6.2.8). If system failure 2 persists, replace the control board.

## System Failure Codes

## 6.2.4 System Failure 3

System failure 3 indicates: During ADC calibration, the software detected a channel out of range.

Cause(s)	Action(s)
During system calibration, J1, J2, and J4 were not unplugged, or calibration jumper JP1 is not installed properly.	Before calibrating, make sure J1, J2, and J4 on the control board are disconnected. Verify JP1 is correctly positioned. (Refer to system calibration instructions.)
Defective circuit on control board	Replace the control board.

## 6.2.5 System Failure 5

System failure 5 indicates: The volt reference is out of the 1.171V - 1.259V range.

Cause(s)	Action(s)
System calibration required	Perform system calibration.
Defective control board	Replace the control board.

## 6.2.6 System Failure 6

System failure 6 indicates: Defective overtemp DAC circuit on the control board.

Cause(s)	Action(s)
System calibration required	Perform system calibration.
Defective control board	Replace the control board.

## 6.2.7 System Failure 7

System failure 7 indicates: 1.0 V Thermistor reference voltage is out of 0.951V - 1.049V range.

Cause(s)	Action(s)
System calibration required	Perform system calibration.
Defective control board	Replace the control board.

### 6.2.8 System Failure 8

System failure 8 indicates: No Line Frequency. When troubleshooting this error code, have control board, 50 pin ribbon cable, and relay board on hand.

Cause(s)	Action(s)
Defective control board	Measure the signal on the control board between J9 pin 43, and TP1-4 (Ground). It should be a 120 hertz signal. If the signal is OK, replace the control board.
Defective 50-pin ribbon cable between the relay board and control board	If no signal, check continuity on the 50-pin cable, pin 43. If defective, replace the cable.
Defective relay board	Replace the relay board.

### 6.2.9 System Failure 11

System failure 11 indicates: The ADC on the control board is not operating to spec (too slow).

Cause(s)	Action(s)
Defective humidifier sensor or cable	Disconnect J1 on the control board. If it powers up OK, either the cable or the humidity sensor is defective. Reconnect J1 and disconnect the 4 pin humidity sensor connector in the compartment probe. If the device now powers up OK, the humidity sensor is defective. If not, the cable is defective.
Defective control board	If the error persists with the replaced sensor or cable, replace the control board.

### 6.2.10 System Failure 12

System failure 12 indicates: Incorrect control board system software checksum.

Cause(s)	Action(s)
Defective system software PROM on control board	Install new system software 2089261-001.
Defective control board	If the error persists with new software, replace the control board.

## System Failure Codes

## 6.2.11 System Failure 13

System failure 13 indicates: Defective SRAM.

Cause(s)	Action(s)
Defective SRAM circuit on control board	Replace control board.

## 6.2.12 System Failure 14

System failure 14 indicates: Defective WDOG.

Cause(s)	Action(s)
Defective watch dog circuit on control board	Replace control board.

## 6.2.13 System Failure 15

System failure 15 indicates: Safety Relay 1 test failure. Unable to turn either heater on or off by switching safety relay 1. When troubleshooting this error code, have on hand at least the 50-pin ribbon cable.

**Note:** If system failure 22 appears during operation, system failure 15 should appear at startup.

Cause(s)	Action(s)
If this error occurs during system calibration, J1, J2, and J4 were not unplugged, or calibration jumper JP1 is not installed properly.	Before calibrating make sure J1, J2, and J4 on the control board are disconnected. Verify jumper JP1 is correctly positioned. (Refer to system calibration instructions.)
Air temperature sensor is above 40C at power-up.	If the device was shut off when the incubator heater was hot, allow the fan to run for a few minutes to cool to below 40C, then power down and back up.
Defective sensor in compartment air probe.	Disconnect connector J1 from the control board. Power cycle the device. If the error clears, either the compartment sensor or the air probe cable is defective. Reconnect J1 and disconnect the compartment sensor connector at the compartment sensor. If the device now powers up OK, the compartment sensor is defective.
Defective compartment sensor cable.	If system failure 15 persists with connector J1 connected, and the compartment sensor disconnected, then the compartment sensor cable is defective.

Cause(s)	Action(s)
No output from heater isolation transformer. Defective relay board.	<p>In service Mode, check the output voltage of the heater isolation transformer at the one pin connectors on the black and white wires on the transformer secondary. This secondary voltage should always read 115 volts.</p> <ul style="list-style-type: none"> <li>• If 115 volts is present, then replace the relay board.</li> <li>• If 115 volts is not present, check that the mains voltage is input to the transformer primaries.</li> <li>• Be sure J49 on the relay board is properly connected.</li> <li>• Verify the configuration plug on the transformer primary is seated properly.</li> </ul> <p>To measure primary input voltage on 115 volt devices:</p> <ul style="list-style-type: none"> <li>• Verify mains voltage is present at pins 2-5 (brown and orange wires) on the transformer primary configuration plug.</li> <li>• Verify mains voltage is present at pins 3-6 (yellow and blue wires) on the transformer primary configuration plug</li> </ul> <p>To measure primary input voltage on 230 volt devices:</p> <ul style="list-style-type: none"> <li>• Verify mains voltage is present at pins 2-6 (brown and blue wires) on the transformer primary configuration plug.</li> <li>• If voltages are not present, verify mains voltage is present at pins 1-4 (black and red wires) on the transformer primary configuration plug.</li> <li>• If not, replace the relay board.</li> </ul>
Defective heater isolation transformer.	If voltage is present at primaries but no voltage output at secondaries, replace the heater isolation transformer.
Defective DAC circuit on control board	If failure persists, replace control board. After replacing the control board, set it to incubator mode and restart the device.
Defective solid state relay (SSR)	<p>Power up the device in service Mode. Run status test on the second service screen and verify that the I/WHTR OFF (incubator/warmer heater off) test fails. If the status test fails, then it is an SSR problem. If the status test does not fail, then try the recommended action for a defective current sense circuit on relay board, below.</p> <p>To determine which SSR is shorted, disconnect an output wire from them one at a time and rerun the status test.</p>
Defective radiant heater SSR	Disconnect the black wire (larger diameter) from the AC side of the radiant heater solid state relay. Run status test. If I/WHTR OFF test passes replace the radiant heater SSR. If it still fails reconnect the wire to the SSR.
Defective incubator heater SSR	Disconnect the black wire (larger diameter) from the AC side of the incubator heater solid state relay. Run status test. If I/WHTR OFF test passes replace the incubator heater SSR. If it still fails reconnect the wire to the SSR.
Defective current sense circuit on relay board	Replace relay board.
Defective 50-pin ribbon cable	If failure persists, replace 50-pin ribbon cable.

## System Failure Codes

## 6.2.14 System Failure 16

System failure 16 indicates: When the device performed Power-on Self Test, either the incubator heater or the radiant heater could not be turned off.

Cause(s)	Action(s)
If this error occurs during System Calibration	Reconnect J1, J2 and J4 on the control board. Put JP1 in Normal position. (Refer to system calibration instructions). Power up device in normal operating mode and follow instructions for the error that occurs.
Defective solid state relay (SSR)	Power up the device in service Mode. Run status test on the second service screen and verify that the I/WHTROFF test fails. If the status test fails, then it is an SSR problem. If the status test does not fail, then try the recommended action for a defective current sense circuit on relay board, below.  To determine which SSR is defective, disconnect an output wire from them one at a time and rerun the status test.
Defective radiant heater SSR	Disconnect the black wire (larger diameter) from the AC side of the radiant heater solid state relay. Run status test. If I/WHTROFF test passes replace the radiant heater SSR. If it still fails reconnect the wire to the SSR.
Defective incubator heater SSR	Disconnect the black wire (larger diameter) from the AC side of the incubator heater solid state relay. Run status test. If I/WHTROFF test passes replace the incubator heater SSR. If it still fails reconnect the wire to the SSR.
Defective current sense circuit on relay board	If failure persists, replace relay board.

## 6.2.15 System Failure 17

System failure 17 indicates: When performing Power-on Self Test in System Calibration mode, the radiant heater could not be turned off.

Cause(s)	Action(s)
	Reconnect J1, J2 and J4 on the control board. Put JP1 in Normal position. (Refer to system calibration instructions.) Power up device in normal operating mode and follow instructions for the error that occurs.

## 6.2.16 System Failure 18

System failure 18 indicates: Defective Variables.

Cause(s)	Action(s)
Defective SRAM circuit on control board	Replace the control board.



### 6.2.17 System Failure 19

System failure 19 indicates: No Audio Frequency.

Cause(s)	Action(s)
Defective PF Battery	PF Battery is only used for power fail. Try powering up the device with the battery disconnected. If the error clears, replace the battery.
Defective scale	Disconnect scale connector at probe panel. Power cycle the device. If the error clears, replace the scale.
Defective scale harness	Disconnect scale harness from J7 on the control board. Power cycle the device. If the error clears, replace the scale harness.
Defective Servo Oxygen board	Disconnect the RS485 harness from J8 on the Servo Oxygen board. Power cycle the device. If the error clears, replace the Servo Oxygen Board.
Defective Servo Oxygen cable	Disconnect RS485 bus cable from J6 on the control board. Power cycle the device. If the error clears, replace the RS485 cable going to the Servo Oxygen board.
Defective audio circuit on control board	Replace socketed IC U22 on control board. If failure persists, replace the control board.
Defective control board	Replace the control board.

### 6.2.18 System Failure 20

System failure 20 indicates: Display WDOG Time Out.

Cause(s)	Action(s)
SBC board software is not performing correctly.	Replace the SBC board.

### 6.2.19 System Failure 22

System failure 22 indicates: During operation, either the radiant heater or the incubator heater will not turn ON.

Cause(s)	Action(s)
Refer to other errors.	Power down the device. During the system tests after power-up, the device should detect system failure 15, radiant heater failure, or bed heater failure. Follow the instructions in this manual for those failures.
Error reading distorted line signal.	Refer to relay board <a href="#">Figure 8-41</a> .
	Refer to the instructions in this manual for system failure 15 (section <a href="#">6.2.13</a> ).

## System Failure Codes

## 6.2.20 System Failure 23

System failure 23 indicates: During operation the system was unable to turn OFF either the radiant heater or the incubator heater.

Cause(s)	Action(s)
Other errors	Power down the device. During the system tests after power-up, the device should detect system failure 16. Follow the instructions in this manual for this failure.
Defective relay board	If system failure 23 persists without system failure 16, replace the relay board.

## 6.2.21 System Failure 25

System failure 25 indicates: Fan rotation is not being detected.

**Note:** System failure 25 and Fan Failure are both triggered by the optical fan sensor not detecting the fan. If this occurs at power-up a system failure 25 will activate. If it occurs after the power tests are completed the Fan Failure alarm will activate.

Circumstance(s)	Cause(s)	Action(s)
Fan is not turning.	Fan is not connected.	Check probe panel connector.
	Fan or fan hub is not seated properly.	Verify the fan hub is properly seated all the way down on the fan shaft and is seated in the groove at the top of the hub.
	Defective relay board	Replace relay board.
	Defective fan motor	Replace fan motor.
Fan is turning.	Fan is turning too slow.	Check fan speed in service Mode, should be about 1500 RPM in high fan speed. Note that this RPM measurement is only tested during the power up tests.

## 6.2.22 System Failure 26

System failure 26 indicates: During the power up tests, the system was unable to turn off safety relay 1.

Cause(s)	Action(s)
Defective relay board	Replace the relay board.

**6.2.23 System Failure 27**

System failure 27 indicates: Defective non-volatile memory.

Cause(s)	Action(s)
Defective circuit on control board	Replace the control board.

**6.2.24 System Failure 28**

System failure 28 indicates: During operation, the SBC board lost communication with control board.

Cause(s)	Action(s)
Refer to system failure 0.	Power down the device, during the self-test the device should detect system failure 0. Follow the instructions for system failure 0.
Defective flat ribbon cable between control board and SBC board.	If system failure 28 persists without system failure 0, replace the flat ribbon cable between control board and SBC board.

**6.2.25 System Failure 29**

System failure 29 indicates: Defective signal on control board.

Cause(s)	Action(s)
Defective control board	Replace the control board.

## System Failure Codes

## 6.2.26 System Failure 30

System failure 30 indicates: Mains voltage reading LV1 is outside of the expected range.

Cause(s)	Action(s)
Mains Voltage Comp Circuit is not calibrated correctly.	Calibrate the line voltage.
High or low mains voltage. This failure is triggered if the mains voltage is outside the following ranges: <ul style="list-style-type: none"> <li>• 100V: 80-115V</li> <li>• 115V: 95-132V</li> <li>• 230V: 195-270V</li> </ul>	Connect to proper mains voltage source.
Defective 50-pin ribbon cable between the relay and control board.	Check for continuity on pin 48 and 49 (LineComp1,2). If defective, replace cable.
Defective relay board	Measure the voltages at the relay board: <ul style="list-style-type: none"> <li>• J37 pin 48-45 and J37 pin 49-45.</li> <li>• If mains voltage 100/115 = 3-5 volts, difference within 0.4 volts.</li> <li>• If mains voltage 230 = 7-10 volts, difference within 0.8.</li> <li>• If not, replace the relay board.</li> </ul>
Defective control board	If the voltages are OK, replace the control board.

## 6.2.27 System Failure 33

System failure 33 indicates: Defective RH Solid State Relay.

Cause(s)	Action(s)
Defective RH Solid State Relay	Replace relay board.

## 6.2.28 System Failure 34

System failure 34 indicates: Software revision level does not match.

Cause(s)	Action(s)
The software revision of the control board and the SBC board are not compatible.	This error may occur after replacing the SBC board. Be sure to install the software provided in the SBC board. Replace the System Software.

### 6.2.29 System Failure 35

System failure 35 indicates: Wrong dipswitch set up.

Cause(s)	Action(s)
Switches set wrong	Check the 8 position dipswitch on the control board. Verify that Switch 1 and Switch 2 are on.
Defective control board	Replace control board.

### 6.2.30 System Failure 36

System failure 36 indicates: LV1 differs from LV2 by >10% of LV2.

Cause(s)	Action(s)
Mains Voltage Comp Circuit is not calibrated correctly.	Calibrate the line voltage.
Defective 50-pin ribbon cable between the relay and control board.	Check for continuity on pin 48 and 49 (LineComp1,2) If defective replace cable.
Defective relay board.	Measure the voltages at the relay board: <ul style="list-style-type: none"> <li>J37 pin 48-45 and J37 pin 49-45.</li> <li>If mains voltage 100/115 = 3-5 volts, difference within 0.4 volts.</li> <li>If mains voltage 230 = 7-10 volts, difference within 0.8.</li> <li>If not, replace the relay board.</li> </ul>
Defective control board.	If the voltages are OK, replace the control board.

### 6.2.31 System Failure 37

System failure 37 indicates: Defective Switches (software 1.60 or higher).

Cause(s)	Action(s)
Both canopy up and canopy down position switches are closed.	Use the service screen to determine which switches are on. Use an ohmmeter to test the switches and cabling.

## System Failure Codes

**6.2.32 System Failure 38**

System failure 38 indicates: Software has detected that door switches show that heater doors are both open and closed (which is not physically possible).

Cause(s)	Action(s)
Defective switches or harness	Use the service screen to determine which switches are on. Use an ohmmeter to test the switches and cabling.

**6.2.33 System Failure 55**

System failure 55 indicates: SBC board On Line Self Test Failure.

Cause(s)	Action(s)
Defective SBC board	Replace the SBC board.

**6.2.34 System Failure 60**

System failure 60 indicates: Line Circuit Failure.

Cause(s)	Action(s)
Failure in relay board LV2 calibration circuitry during calibration	Replace relay board.

**6.2.35 System Failure 61**

System failure 61 indicates: Unable to recover from power fail.

Cause(s)	Action(s)
Device not able to recover from power fail	Power cycle the device. If issue persists replace the Control Board.

**6.2.36 System Failure 62**

Cause(s)	Action(s)
Defective flat ribbon cable between control board and SBC	Make sure ribbon cable is properly connected and if the problem is not resolved, replace the ribbon cable.

**6.2.37 System Failure 63**

Cause(s)	Action(s)
Control board has incompatible software version.	Replace control board software with latest version

**6.2.38 System Failure 70**

Cause(s)	Action(s)
Unexpected SBC software problem	Power cycle the device. If issue persists replace SBC.

**6.2.39 System Failure 71**

Cause(s)	Action(s)
Unexpected SBC software problem	Power cycle the device. If issue persists replace SBC.

**6.2.40 System Failure 81**

Cause(s)	Action(s)
Unexpected SBC software problem	Power cycle the device. If issue persists replace SBC.

**6.2.41 System Failure 82**

Cause(s)	Action(s)
Unexpected SBC software problem	Power cycle the device. If issue persists replace SBC.

## System Failure Codes

**6.2.42 System Failure 83**

System failure 83 indicates: Unexpected SBC Software problem.

Cause(s)	Action(s)
Unexpected SBC Software problem	Power cycle the device. If issue persists, replace the SBC.

**6.2.43 System Failure 85**

Cause(s)	Action(s)
Defective flat ribbon cable between control board and SBC	Make sure ribbon cable is properly connected and if the problem is not resolved, replace the ribbon cable.
Control board issue	Replace control board.
SBC issue	Replace SBC.

**6.2.44 System Failure 98**

System failure 98 indicates: Overflow.

Cause(s)	Action(s)
Software on the control board is not performing correctly.	Replace the control board.

**6.2.45 System Failure 99**

System failure 99 indicates: Logic problem on the control board.

Cause(s)	Action(s)
Software on the control board is not performing correctly.	Replace the control board.



# Chapter 7: Repair Procedures



## **SENSITIVE TO ELECTROSTATIC DISCHARGE CAUTION**

An Electrostatic Discharge (ESD) Susceptibility symbol is displayed to alert service personnel that the part(s) are sensitive to electrostatic discharge and that static control procedures must be used to prevent damage to the equipment.



**Warning:** After performing any repair or calibration, always perform the Service Checkout Procedure before putting the device back into service.

---

## 7.1 Canopy Removal for Service

1. Lock the rails in the intermediate position:
  - a. Raise the canopy.
  - b. Slowly lower the canopy until the rail locking screws align with the horizontal oblong holes in the rails.
  - c. Use a 4 mm hex key to turn the rail locking screws counter-clockwise until they lock both rails in place.
2. Lower the elevating base to a convenient height for reaching the canopy.
3. Switch off the device and disconnect the power cord.
4. Cover the bed with a sheet to catch any parts that may fall.

Canopy Removal for Service

5. Remove the canopy from the device:
  - a. Using a small straight-blade screwdriver, remove the six arrow clips that secure the soffit beneath the control panel end of the canopy. Remove the soffit. (Refer to Figure 7-1.) Save the six arrow clips and soffit for later reinstallation.

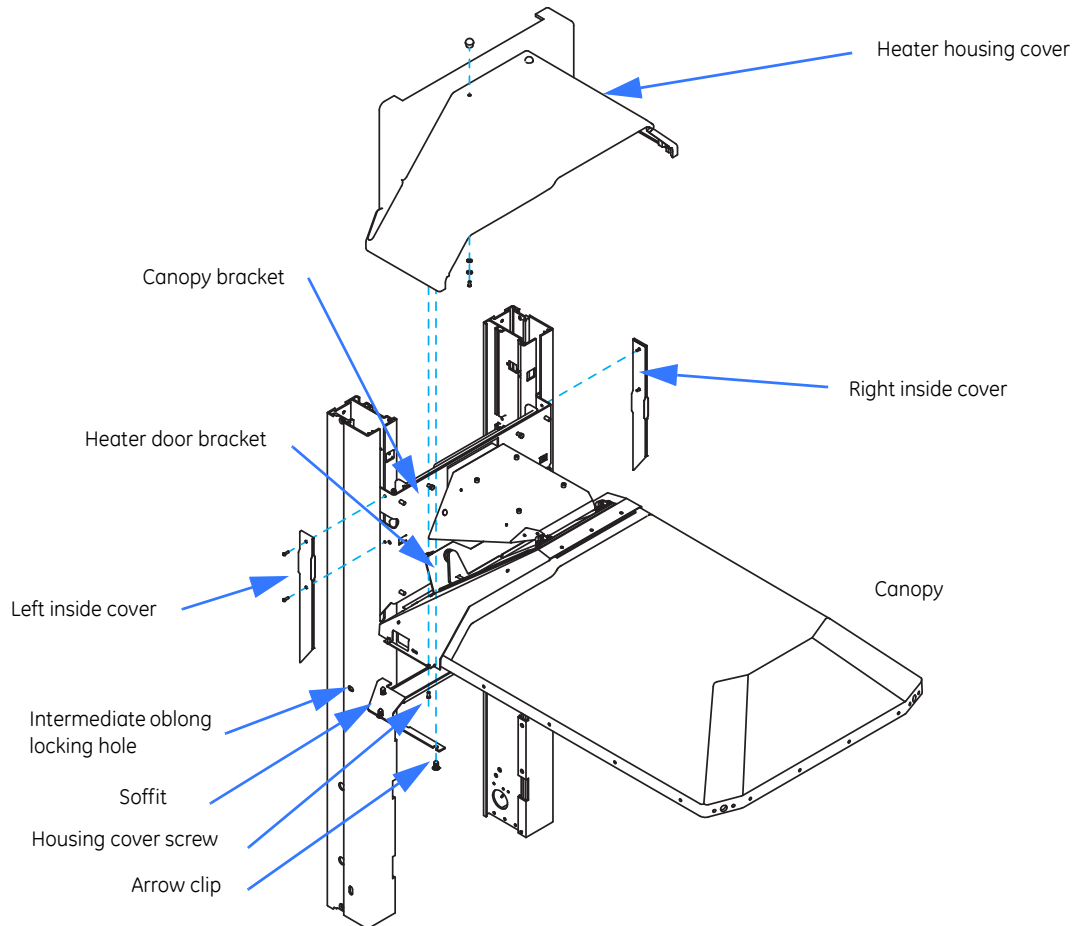
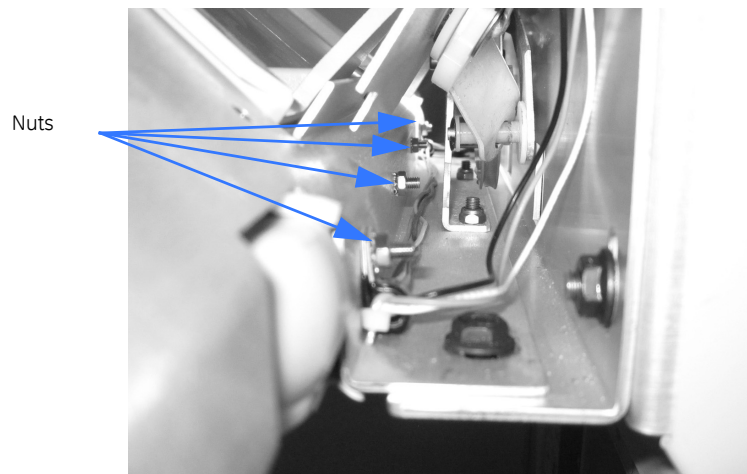


FIGURE 7-1. Heater Housing Cover and Soffit

- b. Using a 2.5 mm hex key, remove the four screws that secure the heater housing cover to the heater door bracket. Remove the heater housing cover. Save the four screws and heater housing cover for later reinstallation.

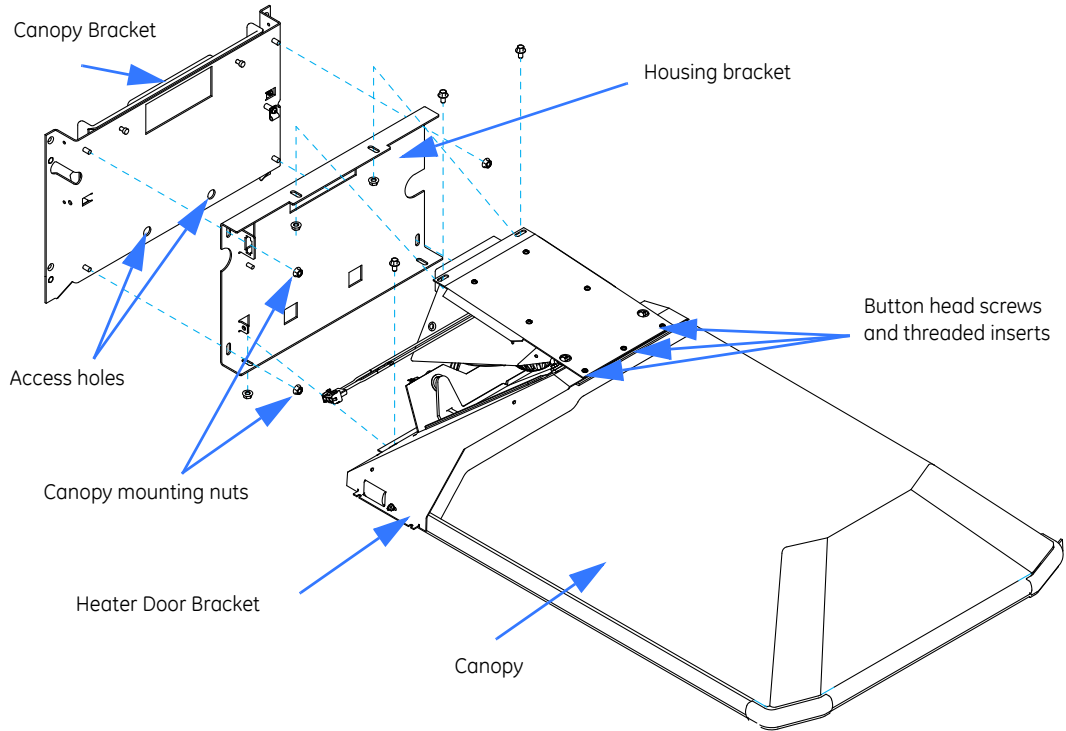


**FIGURE 7-2. Nuts**

- c. Using a 7 mm socket or wrench, remove and discard the four nuts and four star washers across the north end of the heater door bracket that secure the canopy to the heater door bracket. (Two of the nuts are accessed through the north access holes in the canopy bracket.) Take note where cable routing clips are secured, for later reassembly.

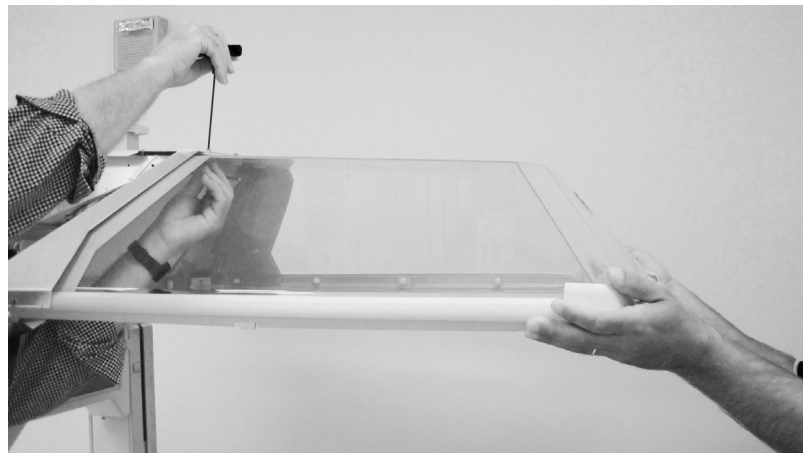


**FIGURE 7-3. Access Holes**



**FIGURE 7-4. Canopy, Bracket, and Heater Housing**

- d. Support the canopy and hold the threaded inserts inside the canopy while using a 2.5 mm hex key to remove the three button head screws across the top of the canopy. This step may require the assistance of another person to support the canopy. Save all hardware from this step for reassembly (the threaded inserts, three button-head screws, lock washers, and flat washers).

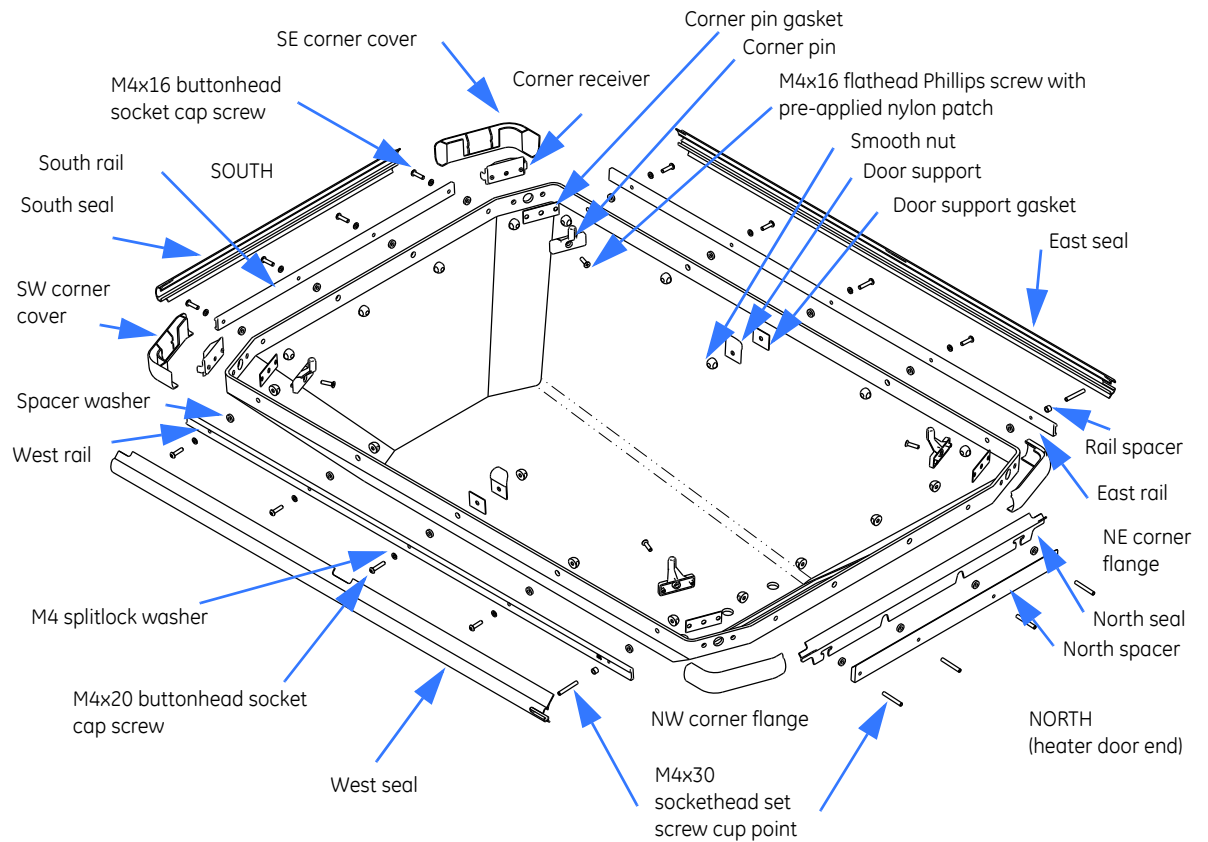


**FIGURE 7-5. Two People Needed for this Step**

- e. Lift the canopy slightly from the south to pivot the north end of the canopy away from the heater door bracket.
- f. Turn the canopy upside down on the clean and soft work surface to avoid scratching the canopy. Save the canopy for later reassembly.

6. Use the Enhanced Seal Retrofit Kit (M1208286) to replace the seal hardware.
7. Clean the canopy before reinstallation.

Refer to the following figure while performing the remaining steps in this section:



**FIGURE 7-6. Canopy Seal Parts**

8. Reassemble in reverse order. If alignment is required, refer to the "7.6.1.1 Realigning the Canopy" section.

Canopy Removal for Service

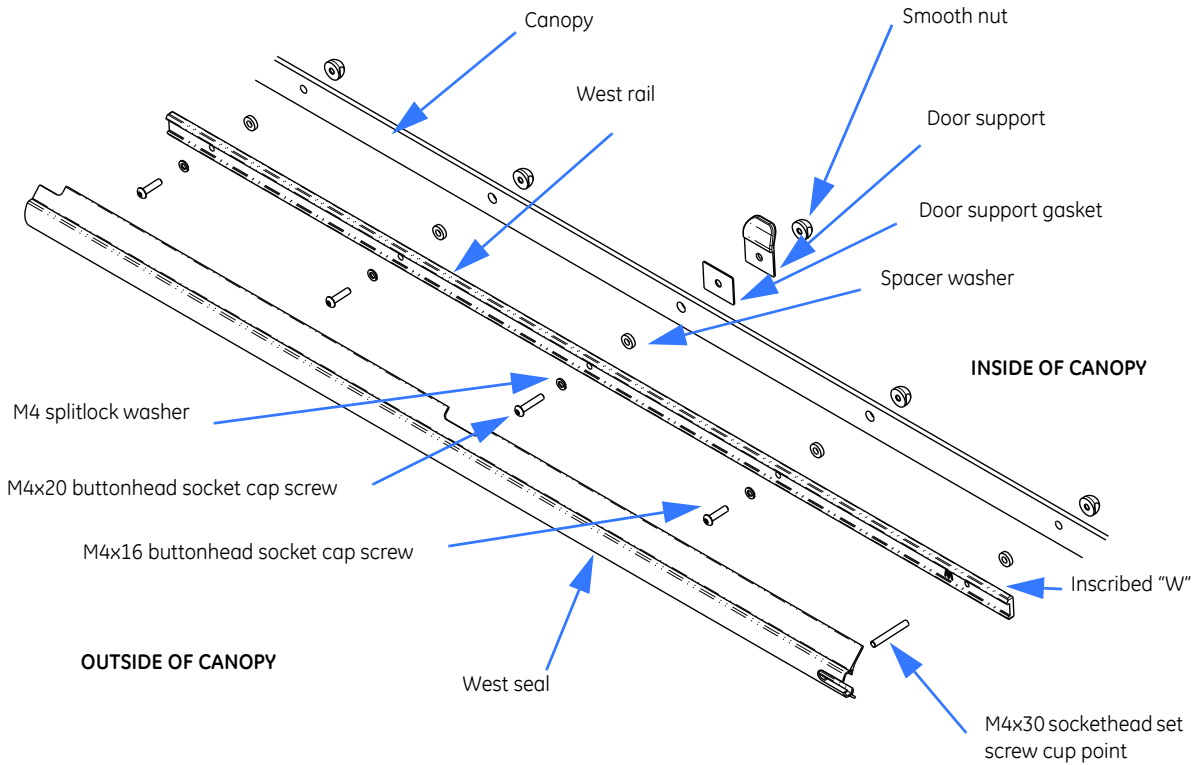


FIGURE 7-7. West Side Seal Parts

**Note:** The east side seal parts are symmetric to the west side seal parts.

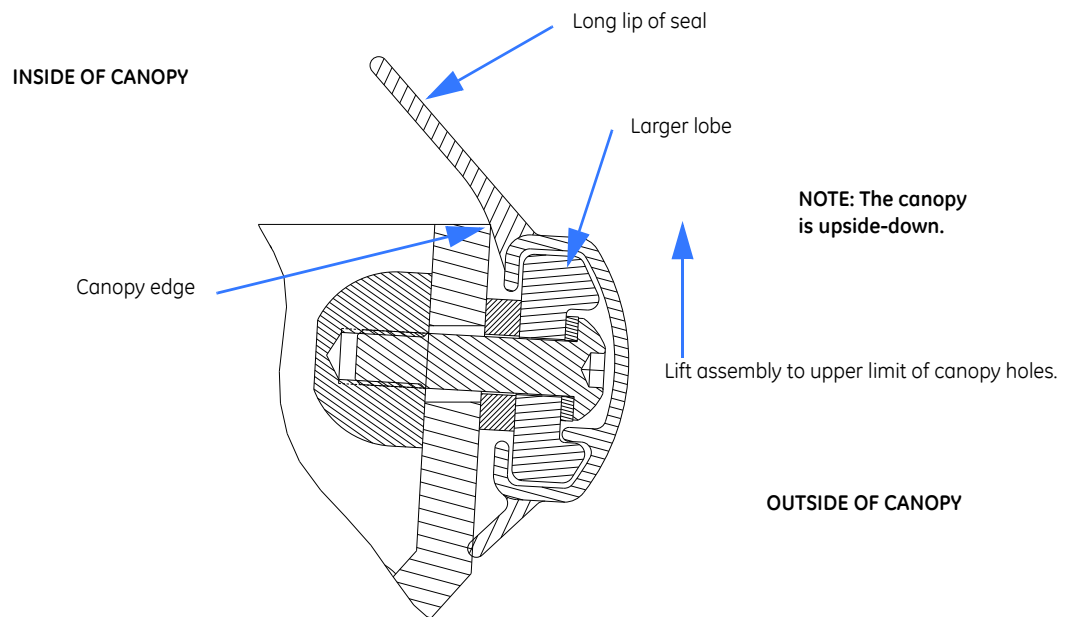
9. Install side seal parts on the upside-down canopy. Start by installing all hardware finger-tight\*:
  - a. Install the east and west seal guide rails with smooth nuts, spacer washers, lock washers, and screws from kit, as shown in Figure 7-7. The larger lobe of each rail should be closest to the edge of the canopy, as shown in Figure 7-9. (This indicates which way is up on each seal.) The rails have "E" and "W" inscribed for east and west. These letters go toward the heater door cutout end of the canopy.
  - b. Position the spacer washers between the rail and canopy for assembly.

**Note:** The cutouts in the north seal may be used to help with this positioning of these washers as shown in the following figure:



**FIGURE 7-8. Using North Seal to Help Position Washers**

- c. Thread the set screw into the threaded hole in the guide rail near the “E” or “W” inscription. Refer to [Figure 7-7](#). The socket of the set screw should be on the outside of the canopy.



**FIGURE 7-9. Seal Cross-section**

- d. At the middle position of the long canopy sides, install the longer screw, lockwasher, spacer washer, gasket, door support, and smooth nut, as shown in [Figure 7-7](#).
- e. Slide the seals on both sides, for alignment purposes. Lift the seal assembly to the upper limit of the canopy holes. Refer to [Figure 7-9](#).
- f. Using a 10 mm open-end wrench, tighten all nuts and screws until they feel snug.
- g. Remove seal and verify that the lock washers are compressed flat. If necessary, tighten with 10 mm open-end wrench and 2.5 mm hex key.



**Caution:** Do not over-tighten the hardware.

Canopy Removal for Service

h. Install and remove seals to check for easy installation.

\* You may wish to retain the hardware by sliding the seal over the rail. Then you can place the spacer washers on that rail assembly before placing the rail assembly on the canopy.

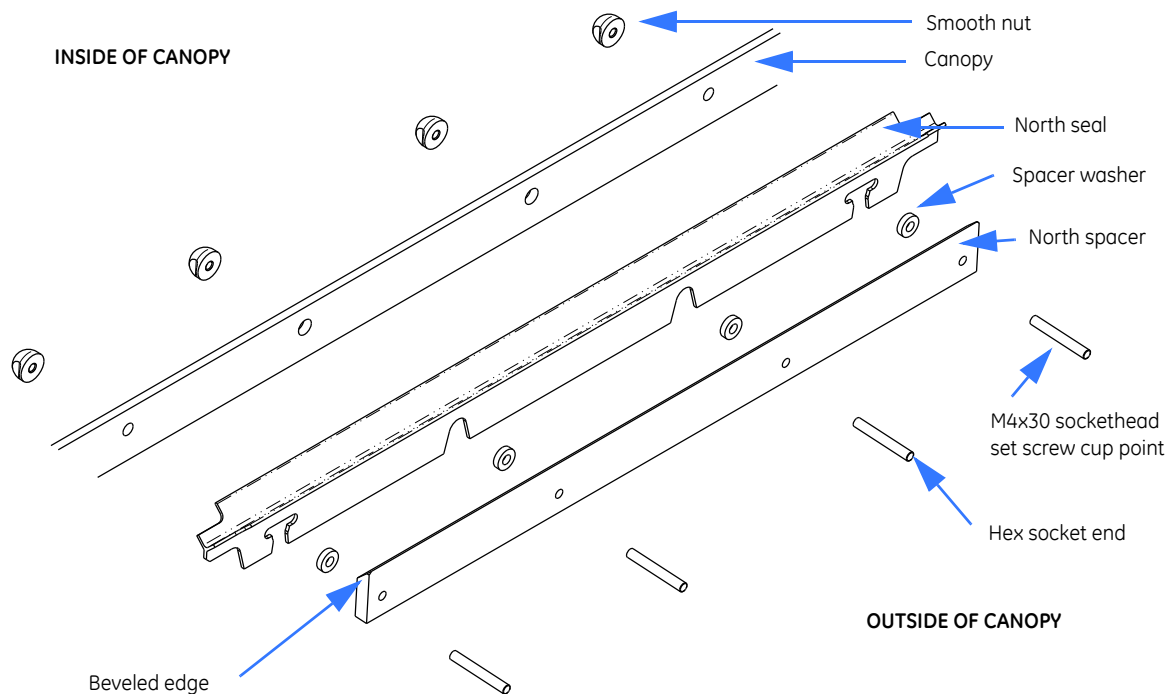


FIGURE 7-10. North Seal Parts

10. Install north seal parts on the upside-down canopy:

a. Orient the north spacer with the beveled side toward the canopy edge, as shown in Figure 7-10 and Figure 7-11.

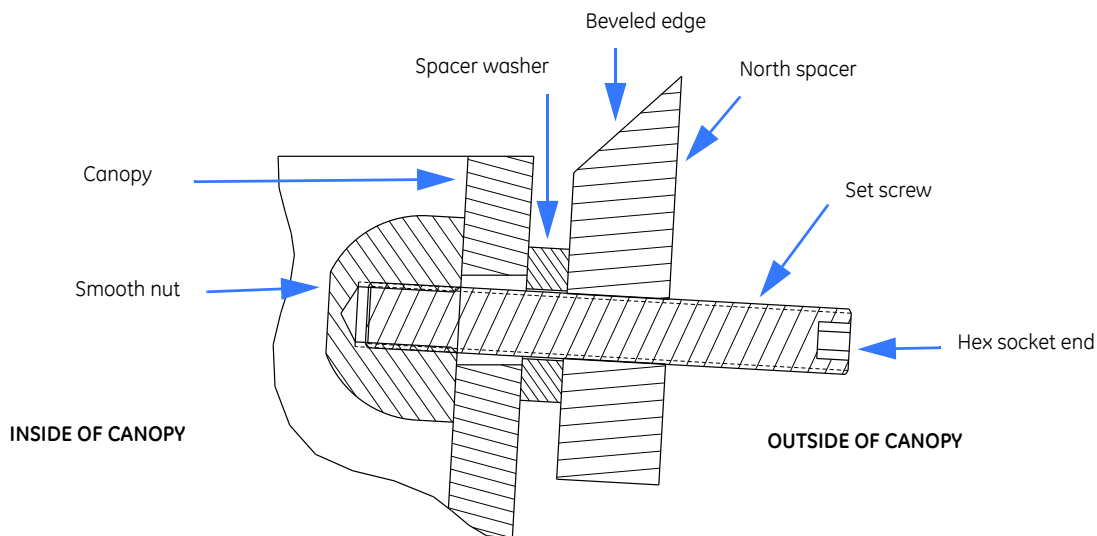
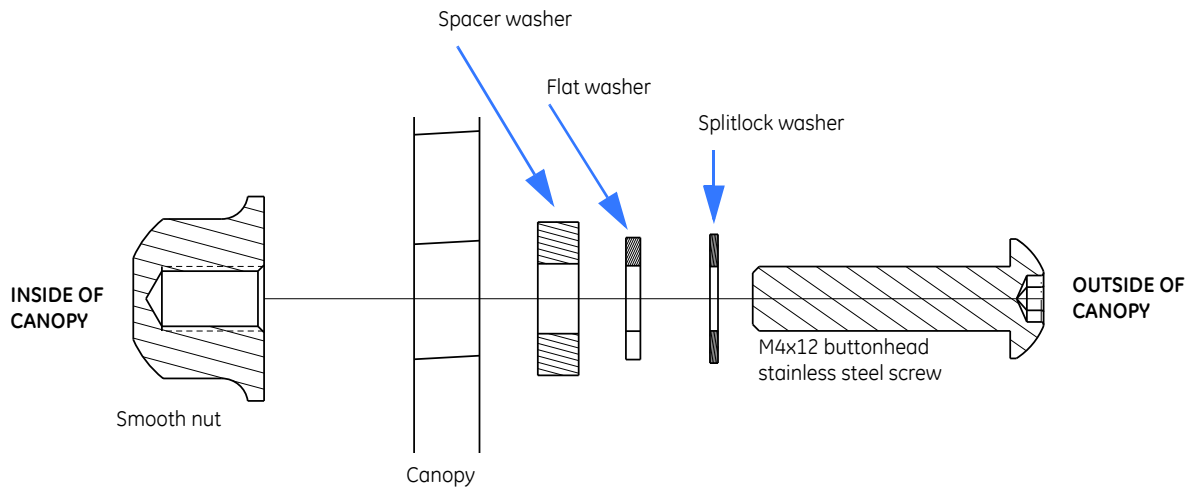


FIGURE 7-11. Beveled Side of North Spacer Toward Canopy



- b. Start all set screws in the spacer, with the hex socket end of the screw pointing to the outside of the canopy.
- c. Add plastic spacer washers to the set screws.
- d. Install the north spacer and washers to the canopy with smooth nuts.
- e. If your canopy has six holes across the north end, install parts for the middle four holes as shown in [Figure 7-10](#) and install parts for the remaining two holes as shown in [Figure 7-12](#). The parts for these two holes serve to fill these two holes.



**FIGURE 7-12. Hole Fill Assembly (2x) for Canopies with Six Holes across North End**

- f. Snap the north seal vertically between the north spacer and canopy for a fit-check. Make sure that the red/orange indicator is not visible from inside the canopy.
- g. Using a 10 mm open-end wrench, tighten all smooth nuts.



**Caution:** Do not over-tighten the hardware.

Canopy Removal for Service

- h. Remove the north seal.

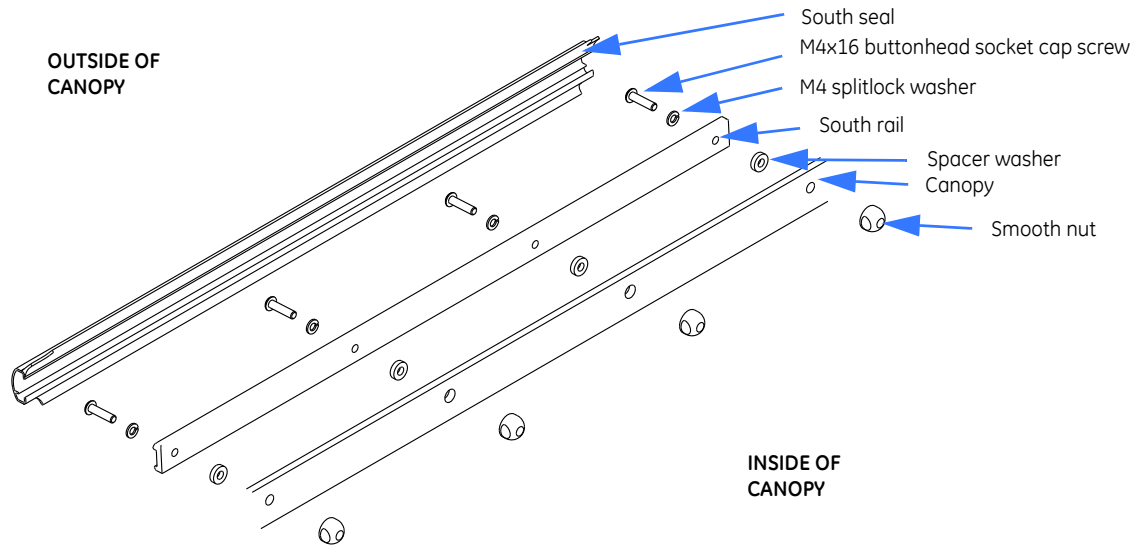


FIGURE 7-13. South Seal Parts

- 11. Install south parts on the upside-down canopy:
  - a. Install the south guide rail with the four button head screws (2.5 mm hex key), washers, and lock washers provided with the kit. Install all hardware finger-tight.
  - b. Slide seal on, for alignment purposes. Lift the seal assembly to the upper limit of the holes.
  - c. Tighten all nuts and screws until they feel snug.
  - d. Remove seal and verify that the lock washers are compressed flat. If necessary, tighten with 10 mm open-end wrench and 2.5 mm hex key.



**Caution:** Do not over-tighten the hardware.

- e. Install and remove seal to check for easy installation.

## 12. Install corner parts:

- a. Using a Phillips screwdriver, install the corner pin, gasket, and corner receiver on the upside-down canopy at each south corner (the corners *opposite* the heater door cutout). The corner receiver rib should be closest to the canopy edge.

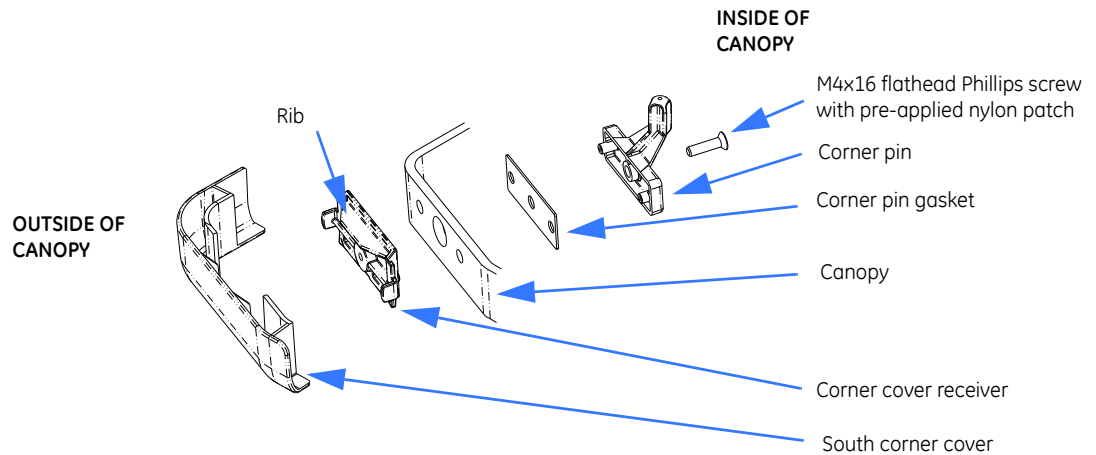


FIGURE 7-14. South Corner Parts

- b. Using a Phillips screwdriver, install the corner pin, gasket, and corner flange on the upside-down canopy at each north corner (the corners *nearest* the heater door cutout):

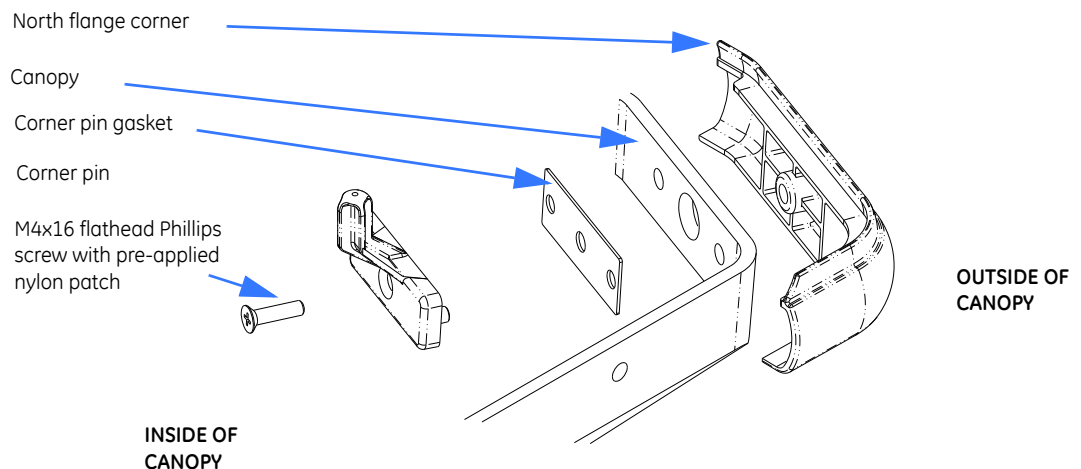


FIGURE 7-15. North Corner Parts

- c. Make sure that all pins point up. (The pins should point up when the canopy is upside-down, down when the canopy is right-side up). Make sure all gaskets are on the inside.
13. Reinstall the canopy. This step may require the assistance of another person, as in [Figure 7-5](#):
    - a. Using a 2 mm hex key, screw the set screws in the east and west rails at the E and W marks until they are flush with the rails.
    - b. Turn the canopy right side up.
    - c. Insert the canopy north end, with the four set screws protruding, into the heater door bracket on the device.
    - d. Hold the canopy in place and hold the threaded inserts inside the canopy while using a 2 mm hex key to install the three button head screws across the top of the canopy.

Canopy Removal for Service

- 14. Install additional hardware:
  - a. Make sure that four set screws are inserted into the heater door bracket. Also make sure that the set screw on each side of the canopy at the display end is aligned with the hole in the heater door bracket.
  - b. Using a 7 mm socket or wrench, install the four nuts and four star washers that secure the canopy to the heater door bracket. Remember to reinstall the cable routing clips on the outboard studs.
  - c. Slide each rail spacer between rail and heater door bracket to align with each set screw on the side rails at the E and W marks. Refer to [Figure 7-16](#). Tighten smooth nuts finger-tight until set screw protrudes through spacer and heater door bracket.

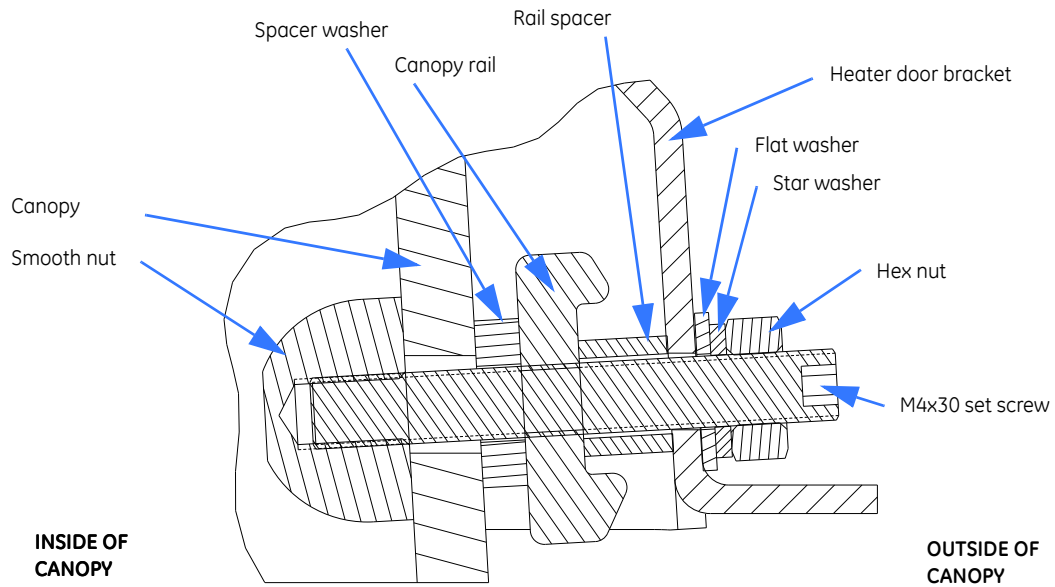


FIGURE 7-16. Installing Rail Spacers

- d. Tighten smooth nut with a 10 mm open end wrench. Make sure rail spacer is still in place between the heater door bracket and rail.

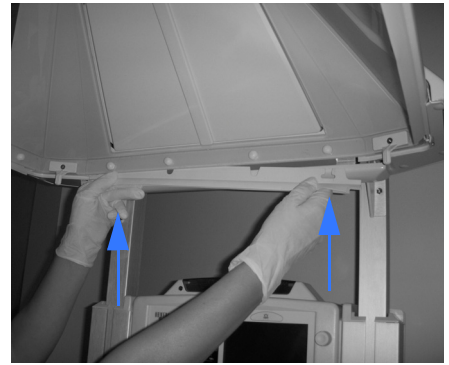


**Caution:** Do not over-tighten the hardware.

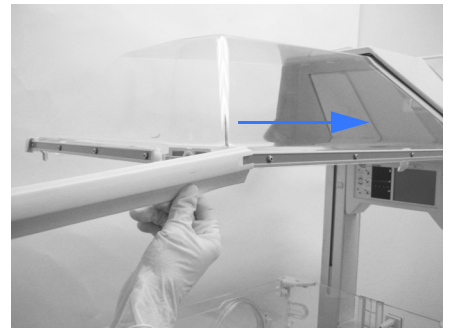
- e. Assemble the star washer and nut on the outside of the heater door bracket and tighten the nut.

## 15. Make sure that all seals can be easily installed:

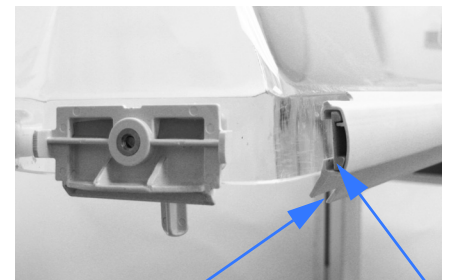
- a. At the north end of the canopy, insert the north notched seal in the slot in front of the red/orange warning spacer and slide it up to snap it into place. You should hear an audible snap from each end. It does not matter which seal lip faces out.



- b. Starting with the south end, slide the slotted end of each long seal over a guide rail on the side of the canopy, with the large seal lip down.



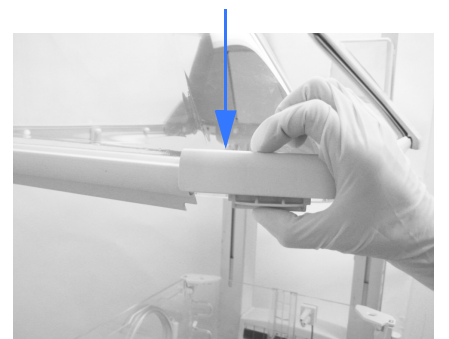
- c. Slide the slotted end toward the display until it stops. The seal should be flush with the end of guide rail. Repeat for the remaining side.
- d. Slide the short seal, large lip down, over the short guide rail on the south end of the canopy. The seal should be flush with ends of guide rail.



Larger seal lip

Flush with guide rail

- e. Select a corner cover that fits each corner and snap it down over the corner receiver. You should hear an audible snap. Repeat for the remaining corner.

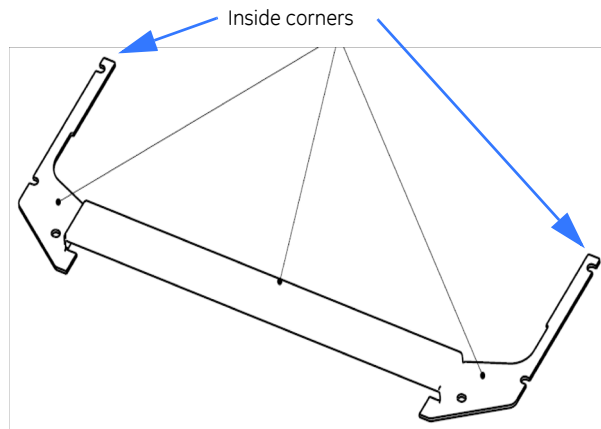


- f. Make sure that all red/orange warning indicators have been covered. Check each canopy seal for secure engagement.



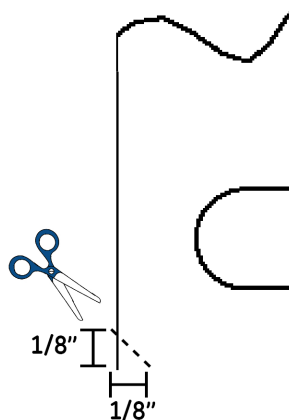
**Warning:** The OmniBed must be properly reassembled per these guidelines. Improper reassembly of the OmniBed may result in unsafe operation of the device.

16. Screw in the rail locking screws in the oblong slot in each rail to unlock the rails. Refer to [Figure 7-1](#).
17. Realign the canopy as described in section [7.6.1.1](#).
18. Using a 2.5 mm hex key and four screws, reinstall the heater housing cover, securing it to the heater door bracket.
19. Trim and reinstall the soffit:
  - a. Remove the north seal.
  - b. Locate two inside corners of ends of the soffit (6600-1461-500).



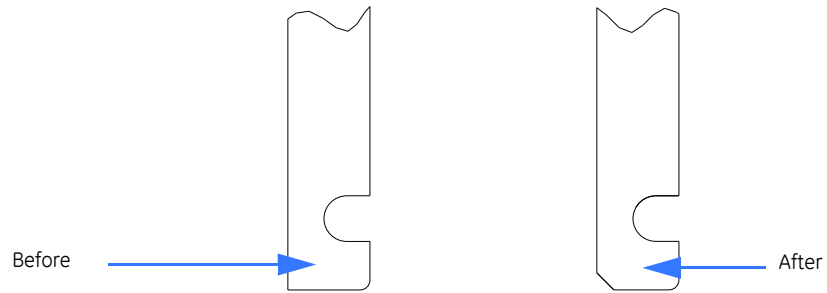
**FIGURE 7-17. Soffit**

- c. Mark approximately one eighth inch (3mm) by approximately 45° cut line at the inside corners identified.
- d. Cut corners with scissors or tin snips as marked.



**FIGURE 7-18. Trimming the Soffit**

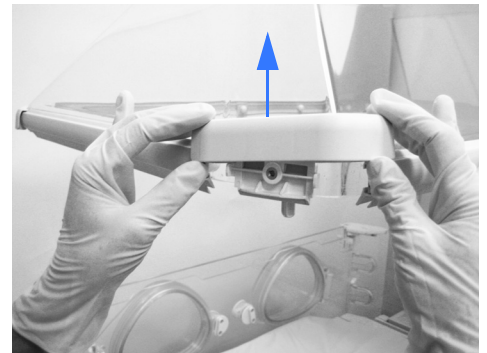
- e. Check for and remove any sharp edges at each of the two corner cuts:



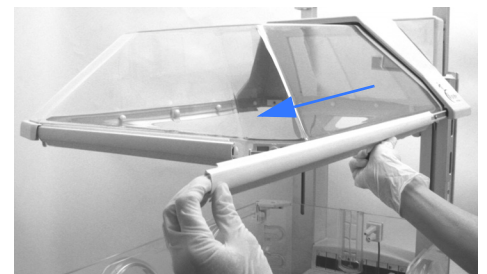
**FIGURE 7-19. Untrimmed and Trimmed Soffit**

- f. Reinstall the soffit using the six arrow clips.
  - g. Reinstall north seal.
20. Make sure that all seals can be easily removed:

- a. Lift and unsnap the corner covers.

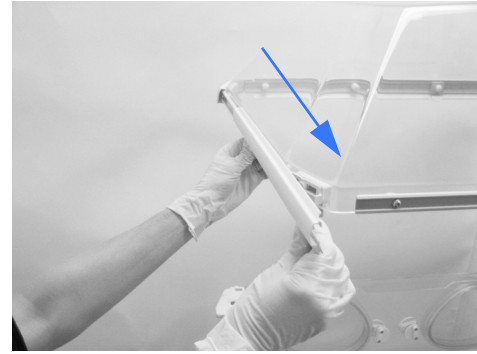


- b. Slide the long side seals away from the display and off the guide rails.

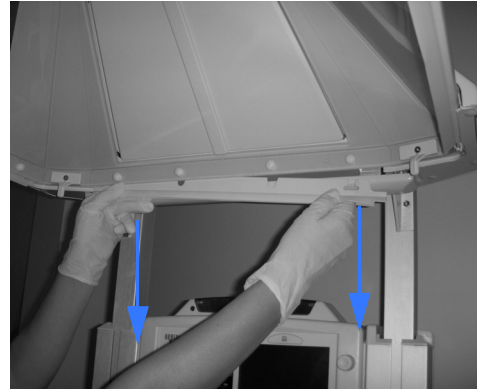


Porthole Door Replacement

- c. Slide the short south seal to the side.



- d. Unsnap the notched north seal by pulling down the ends.



21. Repeat step 10 to reinstall the seals.

22. Perform the checkout procedures in Chapter “Repair Procedures” on page 7-1.



**Warning:** After performing any repair or calibration, always perform service checkout procedures before putting the device back into service.

### 7.1.1 Canopy Seals Replacement Parts

Use the following kits to service canopy seals:

Kit	Part Number
Corner Cover Replacement	M1208283
Seal Replacement	M1208284
Hardware Replacement	M1208285
Small Parts Replacement Kit	M1224510

## 7.2 Porthole Door Replacement

Refer to “[Figure 8-8 Side Panel \(East/West\)](#)”.

1. Use a flat edge screwdriver to pry off the hinge cover.
2. Open the door to unload the springs.
3. Slide the hinge pin down, out the hole at the bottom of the hinge.



4. Remove the porthole door.
5. Now the door springs can be accessed along with screws that secure the inside half of the hinge cover.
6. To replace the porthole door, put the door back in place in the open position, install the springs, then slide the hinge pin back in place.
7. Close the door and snap the hinge cover back in place, keeping the thin side of the cover closest to the porthole.

## 7.3 Display Head Removal

### 7.3.1 Rear Cover

1. Using a 3 mm hex key, remove the 4 (M4 X 10) button head socket screws M4 flat washer and M4 split washers that secure the back cover to the display module and remove the cover.



FIGURE 7-20. Rear Cover

### 7.3.2 Display Head

1. Remove the display housing rear cover. See “Rear Cover” on page 7-17.
2. While referring to Figure 7-22 on page 7-19, slide the decorative strip up about ½" in the groove on the outside of the upright to access hardware that secures the lower end cap. You may wish to use a piece of tape to grip the strip. Use a 2.5 mm hex key to remove the screw, then remove the cap. (On units equipped with the Servo Oxygen option, refer to “End Cap Safety Valve” on page 7-64 for instructions on removing the end cap manifold.) Slide the decorative strip down to access the screw that secures the upper end cap and remove the screw, countersunk washer, and decorative strip. The upper end cap can now be removed by lifting the center cap up out of the lift rail, pushing the exhaust door back, then sliding the outside end cap up and past the spring.
3. Disconnect the SBC Power and Data harness as shown. Using a 7 mm nut driver remove the hex nut and washers that attaches the ground wire (item 1) (See Figure 7-21).

Right Rail Assembly Repair Procedures

- 4. Using a 3 mm hex key, **loosen** the 4 screws that secure the display module to the nut bars on either side of the display module 2-3 turns. (item 2) Do not remove the screws. Using a 2 mm hex key remove the two lower screws holding the nut bar (item 3). While guiding the power and data harnesses through the access hole, carefully pull the display module along with the x2 nut bars up and out of the rails.

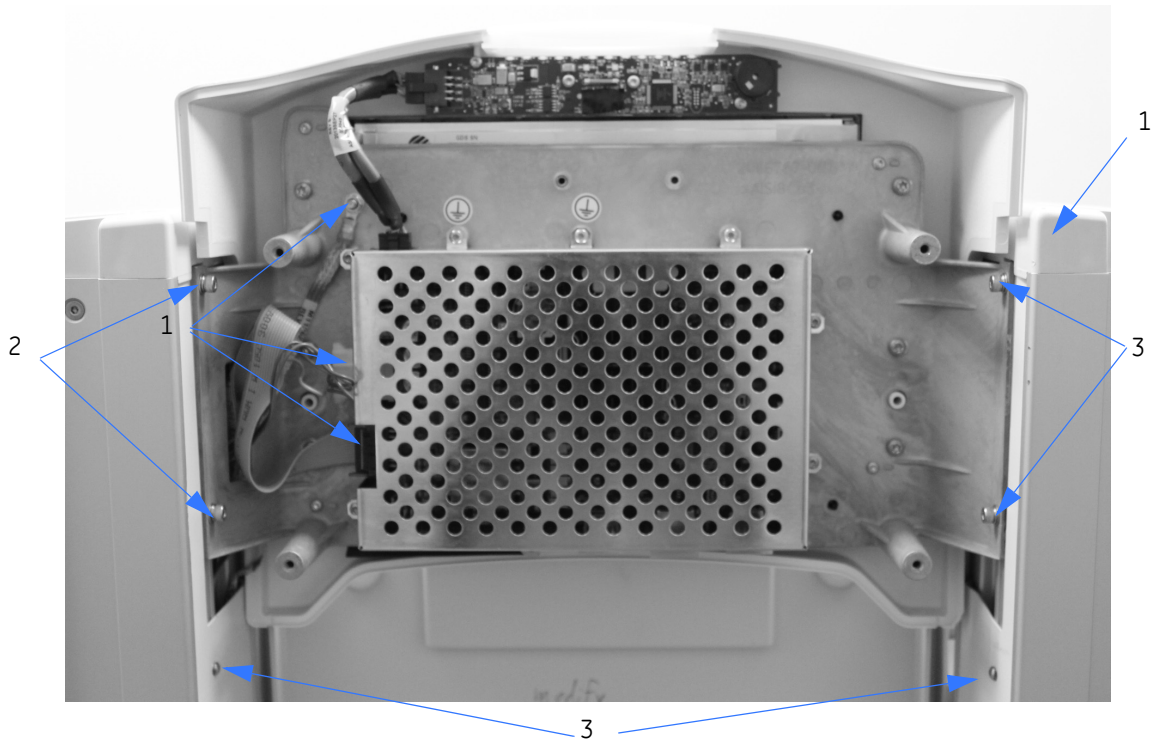


FIGURE 7-21. Display Head Assembly

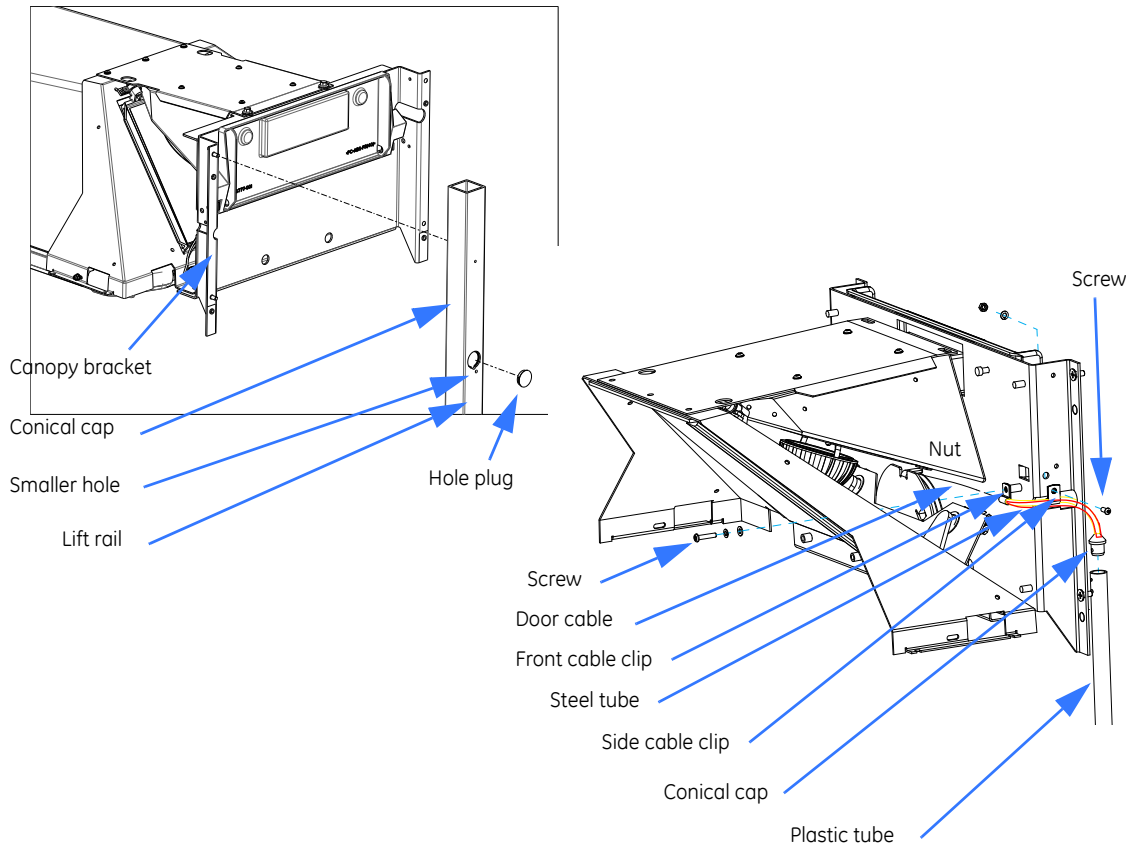
### 7.4 Right Rail Assembly Repair Procedures



**Note:** The entire rail assembly is available or the individual parts may be replaced. Refer to “Illustrated Parts” on page 8-1 for part numbers.

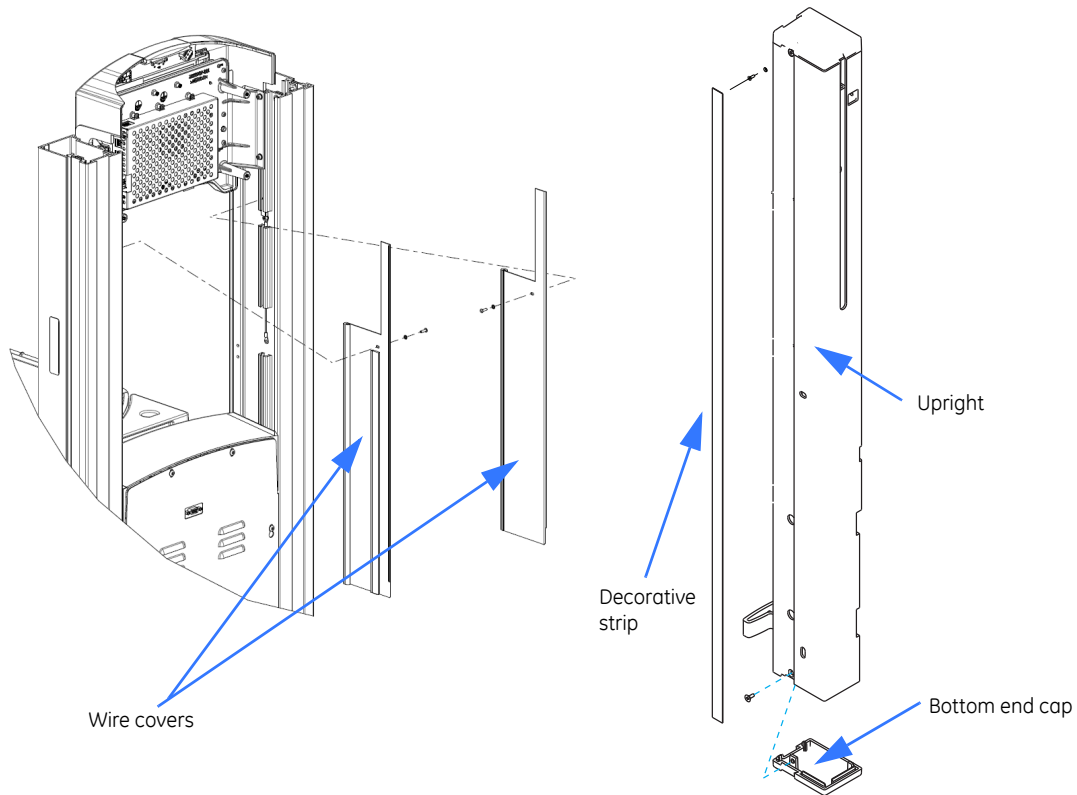
#### 7.4.1 Removing the Right Upright (Motor Side)

Refer to “Figure 7-1 Heater Housing Cover and Soffit”, “Figure 7-22 Disconnecting Heater Door Cable”, “Figure 7-23 Rail Decorative Strips, End Caps, and Wire Cover”, “Figure 7-24 Removing the Lift Motor”, “Display Head Removal” on page 7-17, and “Figure 7-30 Re-attaching the Upright”.



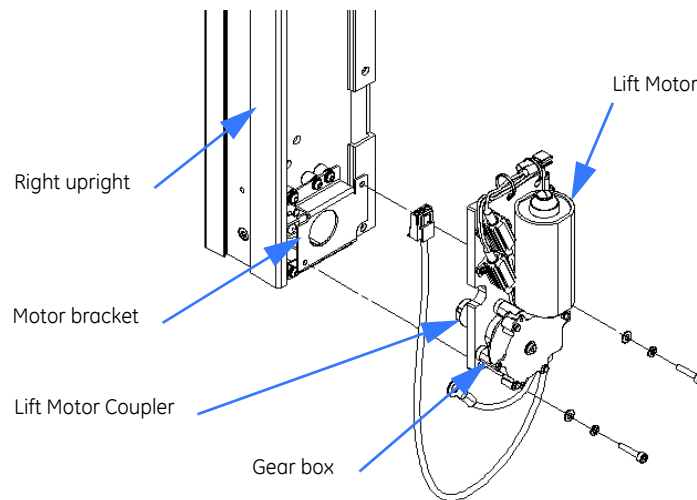
**FIGURE 7-22. Disconnecting Heater Door Cable**

1. Lock the rails in the intermediate position by raising the canopy then slowly lowering it until the rail locking screws align with the horizontal oblong holes in the rails. Lock both rails by turning the screws CCW (4 mm hex key) until they lock the rails in place. Switch off the device and disconnect the power cord.
2. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy and remove the soffit.
3. Using a 2.5 mm hex key, remove the 4 screws that secure the heater housing cover to the heater door bracket and remove the cover.
4. Remove the right inside cover by removing the 2 screws and nuts (2 mm hex key, 5.5 mm wrench) that secure it around the door cable.
5. Remove the steel tube that routes the door cable into the lift rail. Use a 3 mm hex key to remove the screw in the front cable clip. Use a 2.5 mm hex key and 7 mm wrench to remove the screw and nut in the side cable clip.
6. Disconnect the heater door cable. The cable end is accessed through the two holes on the back of the lift rail. First pry off the hole plug, then rotate the plastic tube so the hex head screw securing the conical cap faces the rear. Push a small hex key or screwdriver through the small lower hole in the rail, through the lower hole in the plastic tube inside the lift rail, and back through the rail on the other side of the tube to hold the tube in place. Insert a 2 mm hex key through the larger hole to partially back out the screw that fastens the conical cap to the plastic tube. Pull the cap out of the rail. Pull out the key in the tube hole and let the tube drop down in the upright.



**FIGURE 7-23. Rail Decorative Strips, End Caps, and Wire Cover**

7. Remove the two flat head screws (3 mm hex key) that hold the canopy bracket to the lift rail.
8. Use a 2.5 mm hex key to loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the Control panel cover, then remove the cover.
9. Slide the decorative strip up about  $\frac{1}{2}$ " in the groove on the outside of the upright to access hardware that secures the lower end cap. You may wish to use a piece of tape to grip the strip. Use a 2.5 mm hex key to remove the screw, then remove the cap. (On devices equipped with the Servo Oxygen option, refer to the "7.18.5 End Cap Safety Valve" section for instructions on removing the end cap manifold.) Slide the decorative strip down to access the screw that secures the upper end cap and remove the screw, countersunk washer, and decorative strip. The upper end cap can now be removed by lifting the center cap up out of the lift rail, pushing the exhaust door back, then sliding the outside end cap up and past the spring.



**FIGURE 7-24. Removing the Lift Motor**

10. Remove the Display head assembly by following the steps in “[Display Head Removal](#)” on page 7-17.
11. Remove the screws that secure the connection panel (2.5 mm hex key) at the bottom of the electrical enclosure. Remove the two screws (2.5 mm or 3 mm hex key) that secure the canopy motor/gear box to its mounting plate and remove the motor/gear box.
12. While holding on to the lift rail with one hand, use a 4 mm hex key to tighten (CW) the intermediate stop set screw until the screw bottoms out and the inner rail is free, then carefully let the lift rail extend to its full height, releasing spring tension. It may be necessary to pull gently on the canopy to free the standoffs from the rail.
13. Hold on to the upright, and using a 4 mm hex key, remove the 2 screws in the holes in the lower side of the upright. Remove the entire upright assembly.

You can disconnect the electrical connector and ground to completely remove the upright or, if you wish, there is enough slack in the wiring to allow you to work on the upright on a table or bench close to the device without disconnecting the electrical or ground connection. Refer to section [7.4.3](#) for right rail internal repairs and section [7.4.4](#) for reassembling the right upright.

## 7.4.2 Removing the Left Upright

Refer to “[Figure 7-1 Heater Housing Cover and Soffit](#)” and “[Figure 7-23 Rail Decorative Strips, End Caps, and Wire Cover](#)”.



1. Lock the rails in the intermediate position by raising the canopy then slowly lowering it until the rail locking screws align with the horizontal oblong holes in the rails. Lock both rails by turning the screws CCW (4 mm hex key) until they lock the rails in place. Power down the device and unplug it from the power outlet.
2. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy (refer to [Figure 7-1](#)) and remove the soffit.
3. Using a 2.5 mm hex key, remove the 4 screws and washers that secure the heater housing cover to the heater door bracket and remove the cover.
4. Remove the left inside cover by removing the 2 screws and nuts (2 mm hex key, 5.5 mm wrench) that secure it around the electrical cables.
5. Remove the two flat head screws (3 mm hex key) that hold the canopy bracket to the lift rail.

### Right Rail Assembly Repair Procedures

6. Disconnect the two electrical connectors to the heater housing and feed them out of the slot in the canopy bracket so they do not catch when the rail tension is released.
7. Loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the control panel cover, then remove the cover.
8. Slide the decorative strip up about  $\frac{1}{2}$ " in the groove on the outside of the upright to access the screw that secures the lower upright end cap. Use a 2.5 mm hex key to remove the screw, then remove the cap. Slide the decorative strip down to access the screw that secures the upper upright end cap and remove the screw and decorative strip. The top end cap can now be removed by lifting the center cap up out of the extrusion then sliding the outside end cap up and past the spring.
9. Remove the Display head assembly by following the steps in "[Display Head Removal](#)" on page 7-17.
10. While holding on to the lift rail with one hand, tighten (CW) the intermediate stop set screw until the inner rail is free, then carefully let the lift rail extend to its full height, releasing spring tension. It may be necessary to pull gently on the canopy to free the standoffs from the rail.
11. Hold on to the upright, and using a 4 mm hex key, remove the 2 screws in the holes in the lower side of the upright . Remove the entire upright assembly.

You can disconnect the electrical connector and ground to completely remove the upright or, if you wish, there is enough slack in the wiring to allow you to work on the upright on a table or bench close to the device without disconnecting the electrical or ground connection. Refer to section [7.5](#) for left rail internal repairs and section [7.5.4](#) for reassembling the left upright.

## 7.4.3 Right Rail Internal Repairs

### 7.4.3.1 Removing the Inner Rail Assembly

Refer to “Figure 7-24 Removing the Lift Motor”, “Figure 7-25 Right Rail Disassembly”, and “Figure 7-39 Heater Door Cable Adjustment”.

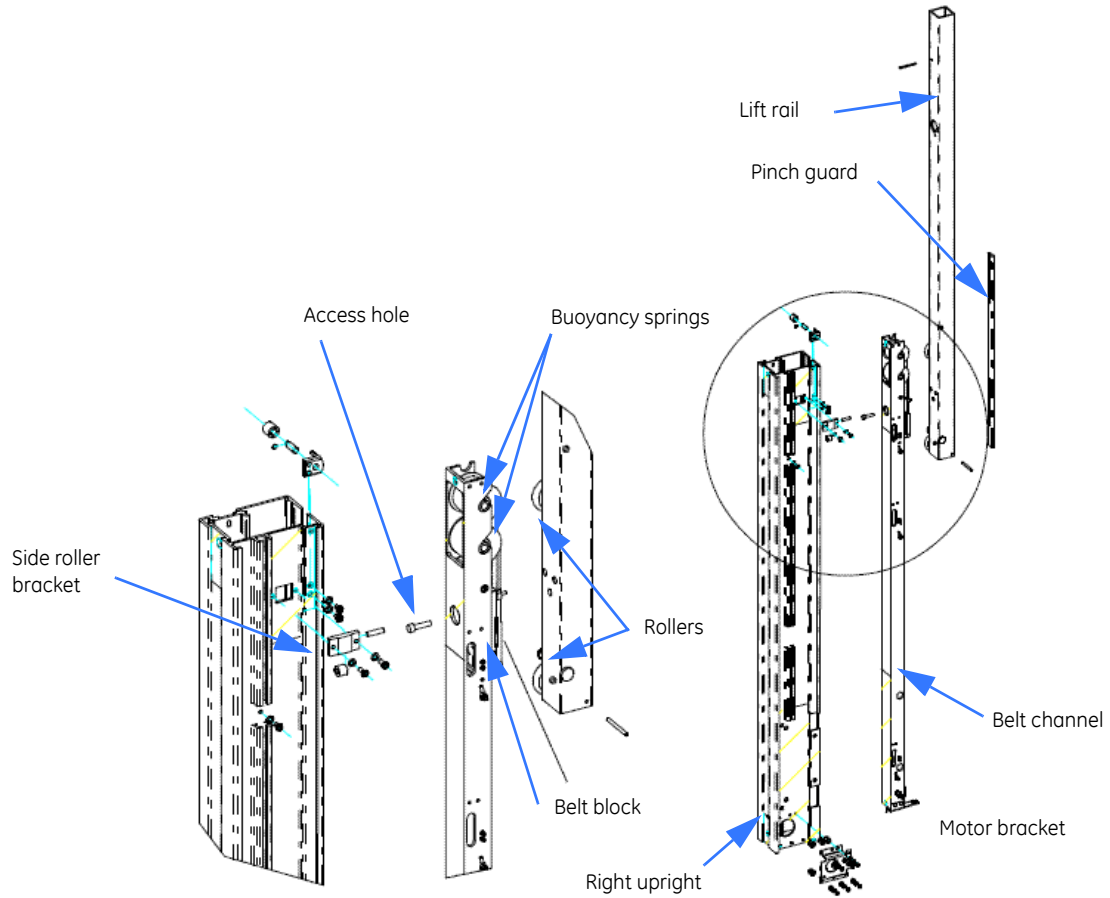


FIGURE 7-25. Right Rail Disassembly

1. Using a 2.5 mm hex key, remove the 2 screws located at either end of the upright in the rear dovetails that secure belt channel to the inside of the upright. Using a 3 mm hex key, remove the side roller bracket. Remove the lift motor coupler components if still attached to the rail assembly. Pull the entire rail assembly up out of the upright.
2. Remove the pinch guard by sliding it up then pulling it off.
3. Remove the nut and washers at the bottom of the belt channel that secure the heater door opening rod to the bracket and remove the assembly.

Right Rail Assembly Repair Procedures

7.4.3.2 Replacing Rollers and Tension Springs

Refer to “Figure 7-26 Rollers and Tensioning Spring”.

STEP 3

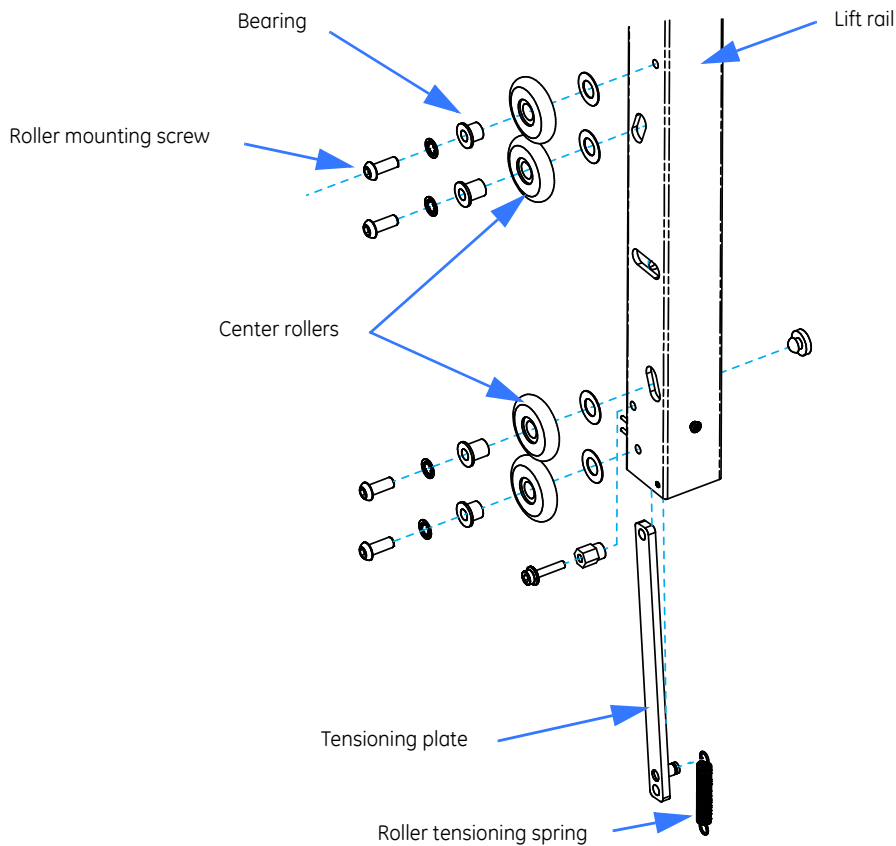


FIGURE 7-26. Rollers and Tensioning Spring

1. The rollers can be removed one at a time by removing the screw (4 mm hex key) at their hub and pulling off the roller and bearing. When reinstalling, torque the screws to 45 in. lbs (reference).
2. To replace the roller tensioning spring, first use needle nose pliers to pull the tension spring off the roll pin at the end of the lift rail. Then take off the 2 center rollers and slide the tensioning plate out of the lift rail. Remove the old spring.
3. Reinstall the 2 center rollers. Use a hex key in the center access slot to lift the tensioning plate up so that you can screw the rollers into the holes in the plate. Torque rollers screws to 45 inch lbs (reference).
4. Using pliers, pull the tensioning spring up onto the roll pin at the end of the rail.

7.4.3.3 Separating the Lift Rail from the Belt Channel

Refer to “Figure 7-25 Right Rail Disassembly”.

1. If you can access the screw head through the access hole in the lift rail go to step 2. If you can not access the screw, push the lift rail and the belt channel together and lift the belt block up past the roll pin so you can see the screw head through the access hole in the lift rail.



2. Remove the screw that secures the lift rail and the belt channel together (this will require either a 3 or 4 mm hex key).

#### 7.4.3.4 Replacing the Rail Buoyancy Springs

Refer to “Figure 7-27 Replacing the Rail Buoyancy Springs”.

1. Using a 5.5 mm wrench, remove the Nylok nuts that secure the spring to the plastic belt block. The springs will roll back around their spools.
2. The spools slide out of their mounting slots. To reinstall the spools, assemble each of the spools by wedging them into the rail with the plastic washers at either end of each spool, then slide all the assemble spools into their mounting slots at the same time. Lubricate the spring spools by placing a drop of Lubriplate where the spool hub seats in the slot.

**Note:** Replace all the buoyancy springs in an upright at the same time.

**Note:** When reassembling the rails, be sure the leaf spring is on top of the micro switch to prevent the switch from breaking off.

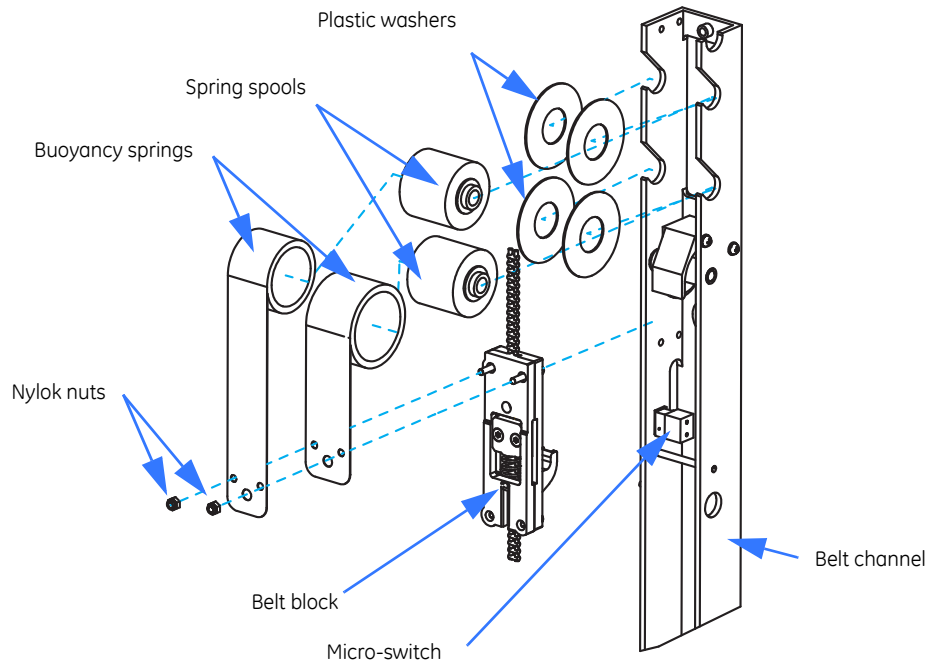


FIGURE 7-27. Replacing the Rail Buoyancy Springs

#### 7.4.4 Reassembling the Right Upright

Refer to “Figure 7-23 Rail Decorative Strips, End Caps, and Wire Cover”, “Figure 7-25 Right Rail Disassembly”, “Figure 7-30 Re-attaching the Upright”, and “Figure 7-39 Heater Door Cable Adjustment”.

1. To reassemble replace the screw that secures the lift rail to the belt channel. If the belt block is not already hooked on the roll pin, then push the lift rail and belt channel together so that the buoyancy springs uncoil about 3 inches and the hook on the belt block can ride up over the roll pin in the belt channel.

### Right Rail Assembly Repair Procedures

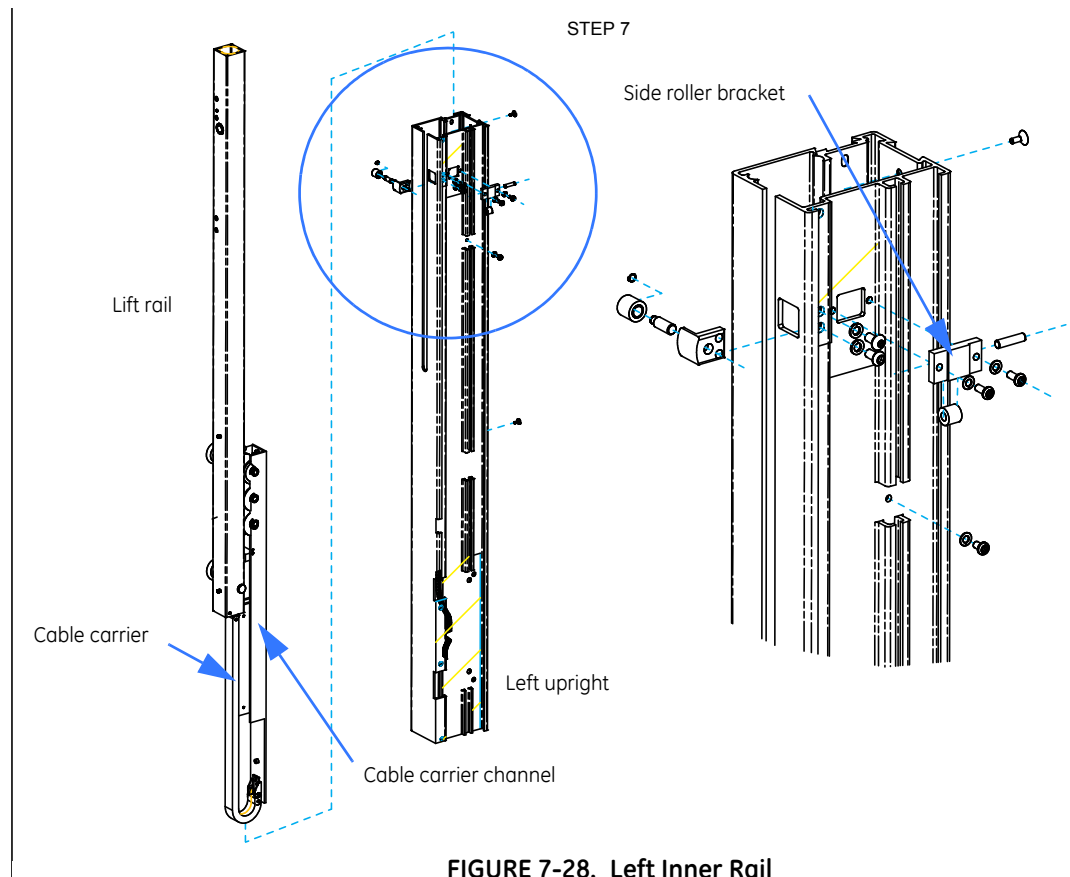
2. Reinstall the pinch guard. Be sure to orient the pinch guard with the holes in the keyhole slots at the bottom of the rail.
3. Drop a length of wire down the inside of the extended upright so that the wire appears at the bottom, and attach that wire to the holes in the upper hole of the tube of the door opening assembly. Then use the wire to pull the tube so that it is guided into the extended upright. Ensure that the wire and tube cannot fall back down the extended upright.
4. Slide the assembly back into the upright, reinstall the screws that secure it to the belt channel and reinstall the side roller bracket. To make sure it is properly seated in its tracks, move the rail assembly through its full range of travel to make sure it does not hang-up or bind before reattaching the upright to the device. Reinstall the 2 pieces of the motor coupler that fit on the shaft at the base of the upright that mate with the coupler piece on the gearbox shaft.
5. To assist in reattaching the upright to the device, there are four mounting studs on the bracket casting that mate with four holes in the upright. Place the upright on the studs. Be sure the canopy bracket is in front of the upright. Be careful not to pinch any wires between the device and the upright.
6. Secure the upright to the device by reinstalling the 2 screws in the holes inside the upright. Pull any excess wiring slack in the upright channels into the electrical enclosure. Be careful not to drop the screws into the upright.
7. Push the lift rail down into the upright until the rail locking screws align with the horizontal oblong holes halfway down the rail. Lock the rail by turning the screws CCW (4 mm hex key) until they lock the inner rail in place. Install the two flat head screws that attach the canopy bracket to the lift rail.
8. Attach ground wire to rail. Fasten the display module to the upright with the two screws and nut bar removed earlier.
9. Reinstall the wire cover. Take care to route the wires in the upright channels and not to pinch them with the cover when securing with the screw.
10. Remove the Display head assembly by following the steps in ["Display Head Removal" on page 7-17](#).
11. Raise the elevating base to the highest position.
12. Using the wire that was attached to the tube, position the tube so that the lower hole in the tube lines up with the small hole in the back of the lift rail. Push a hex key through the smaller hole in the lift rail into the lower hole in the tube to hold the tube in place. You may want to tape the hex key in place so that it cannot fall out during assembly. Remove the wire.
13. Reconnect the heater door cable. Push the conical cap back through the hole in the front of the lift rail. Reconnect the conical cap to the plastic tube by tightening the screw. Do not over-tighten the screw or you may damage the plastic tube. Reinstall the access hole cover.
14. Secure the steel cable routing tube back in position with its 2 mounting screws.
15. Attach the door cable assembly to the bracket at the bottom upright. Position the top nut and flat washer so the bottom of the flat washer is in the middle of the threads. Slide the threaded heater door opening rod through the bracket, then install the flat washer, lock washer, and nut (8 mm wrench).
16. Use a straight blade screwdriver in the slot at the cable rod's end to hold the rod and use the wrench to tighten the bottom nut.
17. Install the upper end cap.
18. Slide the decorative strip up and install the bottom end cap.
19. Reinstall the right inside cover around the door cable with the 2 nuts and screws removed earlier.
20. Reinstall the heater housing cover and canopy soffit.
21. Release the intermediate rail locks by tightening the rail locking screws so the screw heads disengage from the horizontal oblong holes in the uprights.
22. Reinstall the lift motor/gear box. In order to get the splines on the motor coupler to line up you may need to push the lift rail into the upright to rotate the rail side coupler. Then reattach the motor/gear box to its mounting plate with the 2 screws removed earlier.

23. Reinstall the connection panel at the bottom of the electrical enclosure. Fasten the control panel cover to the back of the enclosure.

## 7.5 Left Rail Internal Repairs

### 7.5.1 Removing the Inner Rail Assembly

Refer to "Figure 7-28 Left Inner Rail".



**FIGURE 7-28. Left Inner Rail**

1. Using a 2.5 mm hex key, remove the 2 screws in the rear dovetail of the upright that secure the cable carrier channel to the inside of the upright. One screw is located at the top of the upright; the other is half way down. Using a 3 mm hex key, remove the side roller bracket. Pull the entire rail assembly out of the upright.
2. Remove the pinch guard by sliding it up then pulling it off.

### 7.5.2 Replacing the Rail Buoyancy Springs

Refer to "Figure 7-29 Left Rail Springs and Spools".

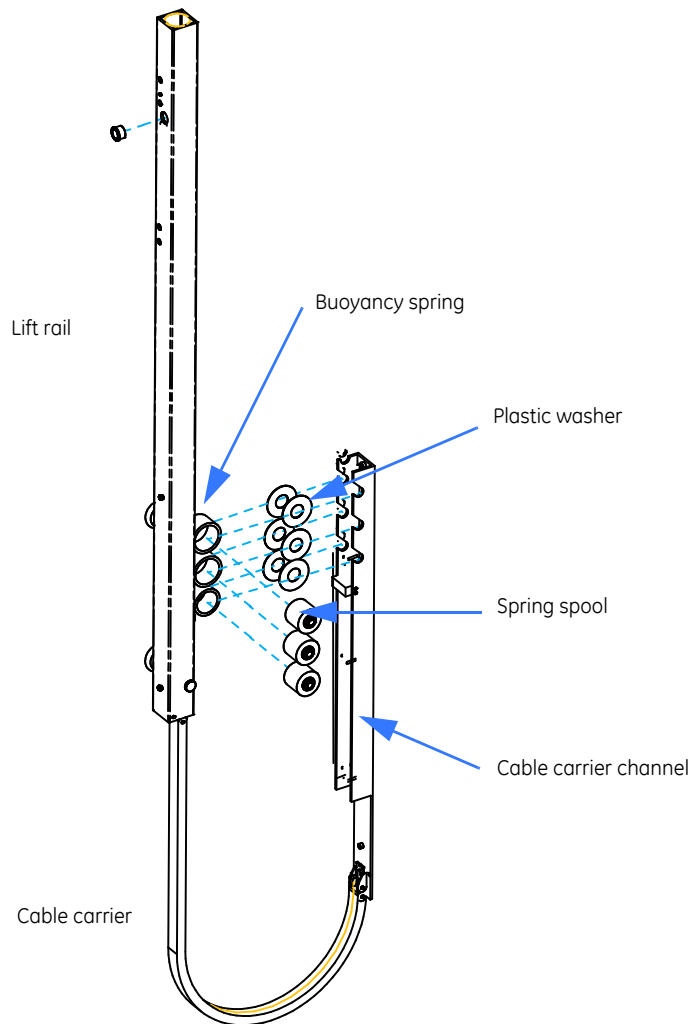


FIGURE 7-29. Left Rail Springs and Spools

1. Using a 4 mm hex key, remove the screw that secures the springs to the lift rail. The springs will roll back around their spools.
  - a. The spools slide out of their mounting slots. To reinstall the spools, assemble each of the spools by wedging them into the rail with the plastic washers at either side of each spool, then slide all the assembled spools into their mounting slots at the same time. Lubricate the spring spools by placing a drop of Lubriplate where the spool hub seats in the slot.

**Note:** Replace all the buoyancy springs in an upright at the same.

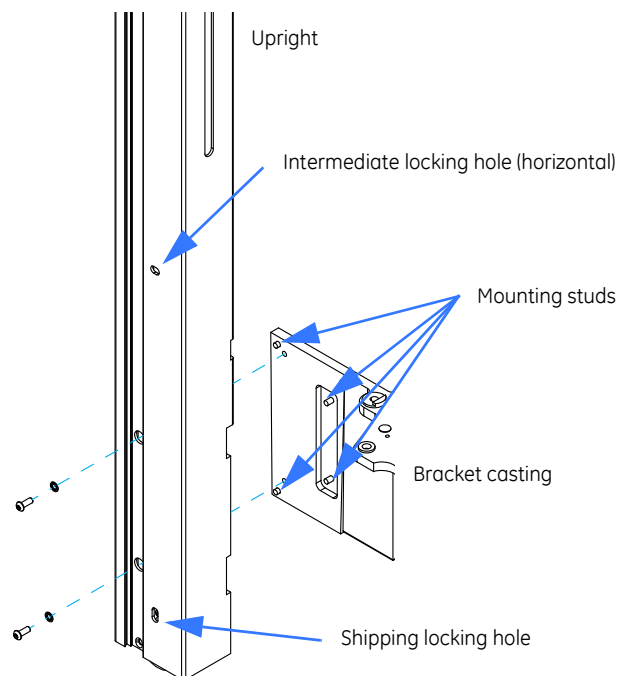
### 7.5.3 Replacing Rollers, Tension Springs, and Cable Carrier Links

Refer to “Figure 7-26 Rollers and Tensioning Spring”.

1. The rollers can be removed one at a time by removing the screw (4 mm hex key) at their hub and pulling off the roller and bearing. When reinstalling, torque the screws to 45 in. lbs (reference).
2. To replace the roller tensioning spring, first use pliers to pull the tension spring off the roll pin at the end of the lift rail. Then take off the 2 center rollers and slide the tensioning plate out of the lift rail. Remove the old spring.
3. Reinstall the 2 center rollers. Use a hex key in the center access slot to lift the tensioning plate up so that you can screw the rollers into the holes in the plate. Torque the screws to 45 in. lbs (reference).
4. Using pliers, pull the tensioning spring up onto the roll pin at the end of the rail.
5. Individual links of the flexible cable carrier snap out of the belt by unfolding them from their center. To replace the link that fastens the carrier to the channel, drill out the rivet and replace it with a M3 x 8 screw.

### 7.5.4 Reassembling the Left Upright

Refer to “Figure 7-23 Rail Decorative Strips, End Caps, and Wire Cover”, “Figure 7-28 Left Inner Rail”, “Figure 7-29 Left Rail Springs and Spools”, and “Figure 7-30 Re-attaching the Upright”.



**FIGURE 7-30. Re-attaching the Upright**

1. Reinstall the pinch guard. Be sure to orient the pinch guard with the holes in the keyhole slots at the bottom of the rail.
2. Position the lift rail and the cable carrier channel so that the plastic boss is past the metal stop block and the coil springs have a slight tension. Slide the channel and lift rail together so that the last tensioning roller is just entering the upright. Align the screws with the holes. Slide the assembly back

### Left Rail Internal Repairs

into the upright. Using a 3 mm hex key, reinstall the side roller bracket. To make sure it is properly seated in its tracks, move the rail assembly through its full range of travel to make sure it does not hang-up or bind before reattaching the upright to the device.

3. To assist in reattaching the upright to the device, there are four studs on the bracket casting that mate with four holes in the upright. Place the upright on the studs. Be sure the radiant heater bracket is in front of the upright. Be careful not to pinch any wires between the device and the upright.
4. Secure the upright to the device by reinstalling the 2 screws in the holes inside the upright. Pull any excess wiring slack in the upright channels into the electrical enclosure.
5. Push the lift rail down into the upright until the rail locking screws align with the horizontal oblong holes in the rail. Lock the rail by turning the screws CCW (4 mm hex key) until they lock the inner rail in place.
6. Attach ground wire to rail. Fasten the display module to the upright with the two screws and nut bar removed earlier.
7. Reinstall the wire cover. Take care to route the wires in the upright channels and not to pinch them with the cover when securing with the screw.
8. Remove the Display head assembly by following the steps in ["Display Head Removal"](#) on page 7-17.
9. Reinstall the decorative strip and the two end caps.
10. Fasten the control panel cover to the back of the enclosure.
11. Attach the canopy bracket to the lift rail with the 2 screws removed earlier.
12. Reconnect the 2 electrical connectors for the radiant heater.
13. Reinstall the left inside cover around the electrical cables with the 2 nuts and screws removed earlier.
14. Reinstall the heater housing cover and canopy soffit.
15. Release the intermediate rail locks by tightening the set screws so that the screw heads disengage from the horizontal oblong holes in the uprights.

### 7.5.5 Replacement of the Left Upright Heater Wire Harness/Cable Carrier Assembly

The heater wire harness/cable carrier assembly (6600-0710-700) includes both the wire harness and the cable carrier. The end links of the cable carrier are riveted to the lift rail and the cable carrier channel (2 pop rivets at each end). The easiest way to replace the harness is to reuse these end links of the cable carrier. If the end link of the cable carrier is damaged, there are two options:

- Replace the entire left upright assembly (6600-0288-851). (Refer to section [7.4.2](#))
- Drill out the rivets that secure the broken link to the lift rail or Cable carrier channel. Remove the end link from the new assembly and rivet it in place. Then follow the instructions below. Two rivets are required for each end of the cable.

6600-1160-400                      Pop Rivet Stainless Steel, Body Diameter .125", body length .313"

The 3-pin MAT-N-LOK connector for the radiant heater connections must be removed from the old harness using a pin extractor. If a pin extractor is not available, order a new connector when you order the harness. Four cable ties are also required..

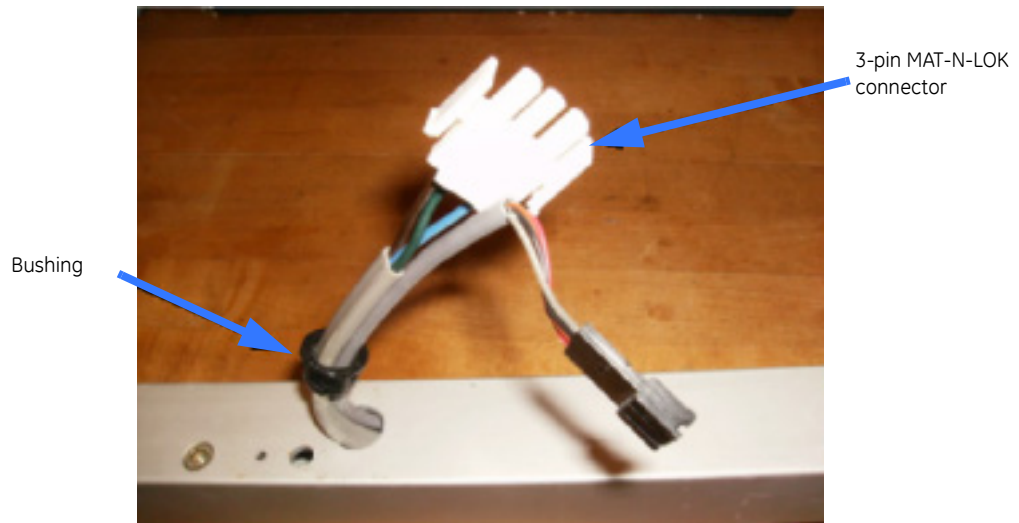
6600-1097-603                      3 pin Universal MAT-N-LOK connector

6600-0384-400                      Cable Tie

### 7.5.5.1 Removing and Disassembling the Rail

Refer to "Figure 7-29 Left Rail Springs and Spools".

1. Remove the left upright following section 7.4.2.
2. Remove the inner rail assembly following section 7.4.3.1.
3. Remove the 3 buoyancy spring spools from the cable carrier channel. Save the spring spools and plastic washers for reinstallation.
4. Remove the 3-pin MAT-N-LOK connector (cut wires or extract pins) from the harness on the side of the left rail.



**FIGURE 7-31. 3-pin MAT-N-LOK Connector and Bushing**

5. Remove the bushing on the side of the left rail.
6. Attach a wire or string to this harness to assist in threading the new cable assembly through the rail.
7. Remove the old harness from the left rail. Be sure to save the bushing for use in installing the new harness.

Left Rail Internal Repairs

7.5.5.2 Reinstalling the Harness on the Left Rail

1. On the left rail end of the replacement harness, mark the location on the harness where the cable tie was located.



FIGURE 7-32. Cable Tie

2. Remove the cable tie that secures the harness to the carrier.
3. Open the first 4 cable guard latches.
4. Unsnap and remove the end link from the cable carrier.
5. Thread cable through the left rail and out hole on side
6. Pull cable through the rail until the cable mark is in the correct position just inside rail.
7. Reinstall the bushing in the hole on the side of the rail
8. Verify the mark on the cable is still in the correct position and reconnect the cable carrier to the end link riveted to the left rail. Close the other 4 cable guard latches.
9. Reinstall new cable tie to secure the harness to the carrier.
10. Reinstall the 3-pin connector.

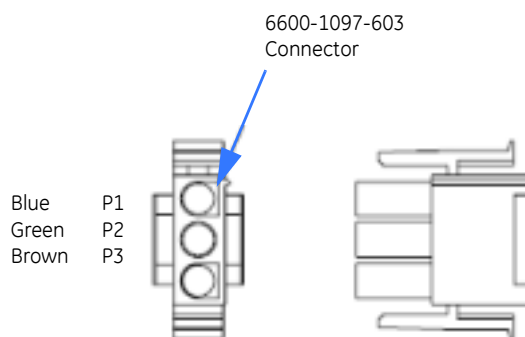
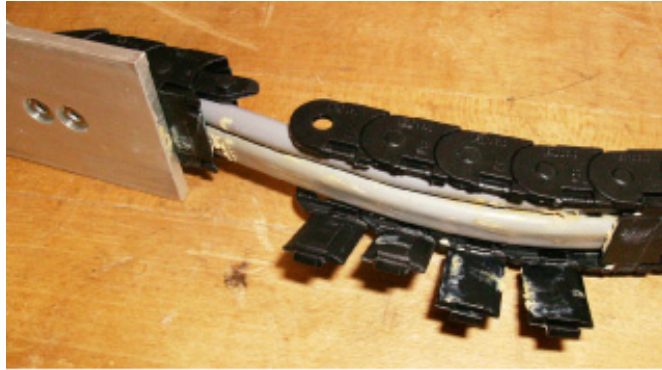


FIGURE 7-33. Connector Drawing



### 7.5.5.3 Removing the Old Harness from the Cable Carrier Channel

1. Open the first 4 exposed cable guard latches at the cable carrier channel end.

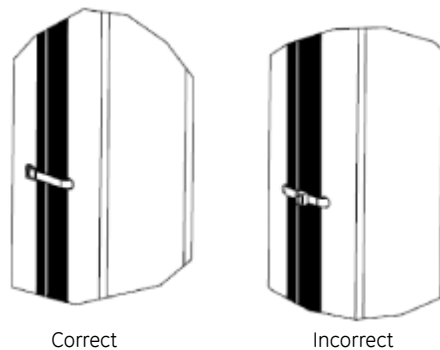


**FIGURE 7-34. Opened Cable Guard Latches**

2. Unsnap the links with open covers leaving the end riveted link and 2 additional links on the cable carrier channel.
3. Remove the 4 cable ties securing the harness to the channel. (Make note of routing and orientation).
4. Remove and discard the harness. You may want to save the cable carrier links to use as spares.

### 7.5.5.4 Installing Harness on the Cable Carrier Channel

1. On the replacement harness open the first 4 cable guard latches at the cable carrier channel end.
2. Remove the end link and the 2 adjoining links and set aside.
3. Route harness along the cable carrier channel and loosely install 4 cable ties. Do not tighten until cable is adjusted properly. Be sure to install in same orientation as ties removed earlier.



**FIGURE 7-35. Correct and Incorrect Cable Tie Usage**

4. Reattach the cable carrier channel to the 3 links riveted to the channel.
5. Close all open cable guard latches.

Radiant Heater Assembly Repair Procedures

6. Bring Lift Rail and Cable Carrier Channel together as shown in the following figure.

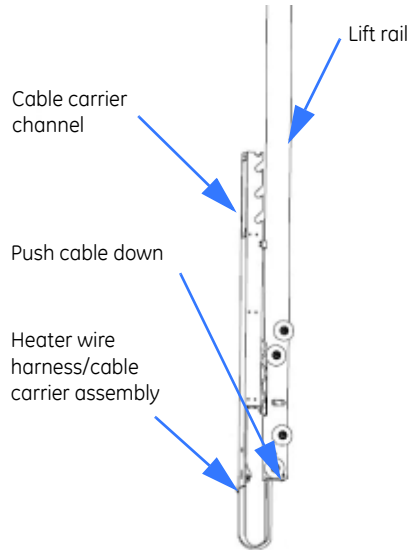


FIGURE 7-36. Lift Rail and Cable Carrier Channel Together

7. Make sure that the cables within the cable guard are not overlapping.
8. Push the cables downward to orient the cables against the outside edge of the cable carrier. This creates enough slack so the cables are not tight as the rails move up and down.
9. Secure cables to riveted end of cable carrier with new cable tie

7.5.5.5 Reassembly

1. Reassemble the buoyancy spring spools and plastic washers in the springs, then into the cable carrier channel.
2. Reassemble and reinstall the left upright following section 7.5.4.
3. After performing any repair always perform the service checkout before putting the device back into service.

7.6 Radiant Heater Assembly Repair Procedures



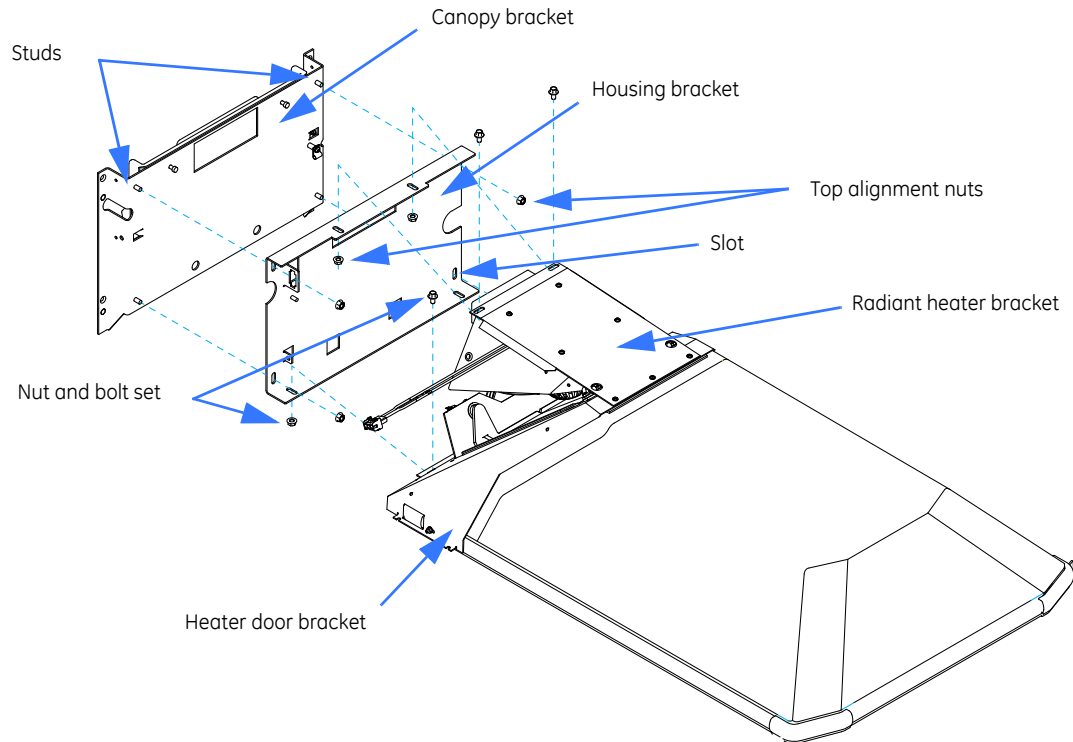
**Warning:** Allow the heater to cool before servicing.

7.6.1 Removing the Canopy/Heater Assembly

Refer to “Figure 7-1 Heater Housing Cover and Soffit”, “Figure 7-4 Canopy, Bracket, and Heater Housing”, “Figure 7-22 Disconnecting Heater Door Cable”, “Figure 7-30 Re-attaching the Upright”, and “Figure 7-37 Canopy Alignment”.

**Note:** It is not necessary to remove the canopy to replace the radiant heater. To replace the radiant heater assembly, perform the instructions in section 7.6.2.

1. Raise the canopy to the intermediate lock position, then lock it in place by loosening the rail locking screws on the outside of both uprights so that their heads engage the holes in the uprights. Shut off the device and disconnect the power cord.
2. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy and remove the soffit.
3. Using a 2.5 mm hex key, remove the 4 screws and washers that secure the heater housing cover to the heater bracket and remove the cover.
4. Disconnect the 2 electrical connections to the heater housing.
5. Remove the right inside cover. Using a 2 mm hex key and a 5.5 mm wrench, remove the 2 screws and nuts that secure the right inside cover.



**FIGURE 7-37. Canopy Alignment**

6. Remove the steel tube that routes the door cable into the extrusion. Use a 3 mm hex key to remove the screw in the front cable clip. Use a 2.5 mm hex key and 7 mm wrench to remove the screw and nut in the back cable clip.
7. Disconnect the heater door cable. The cable end is accessed through the two holes on the back of the lift rail. First pry off the hole plug, then rotate the plastic tube so the hex head screw securing the conical cap faces the rear. Push a small hex key or screwdriver through the small lower hole in the rail, through the lower hole in the plastic tube inside the extrusion, and back through the rail on the other side of the tube to hold the tube in place. Insert a 2 mm hex key through the larger hole to loosen the screw that fastens the conical cap to the plastic tube. Pull the cap out of the rail.
8. Using a 10 mm wrench remove the 4 nuts on the housing bracket that secure the entire assembly to the uprights. Grasp the canopy with both hands and raise it about  $\frac{1}{2}$ " until the keyhole disengages. Remove the canopy/heater assembly.

To reinstall the canopy reverse steps. Take care not to pinch the electrical cables.

### Radiant Heater Assembly Repair Procedures

#### 7.6.1.1 Realigning the Canopy

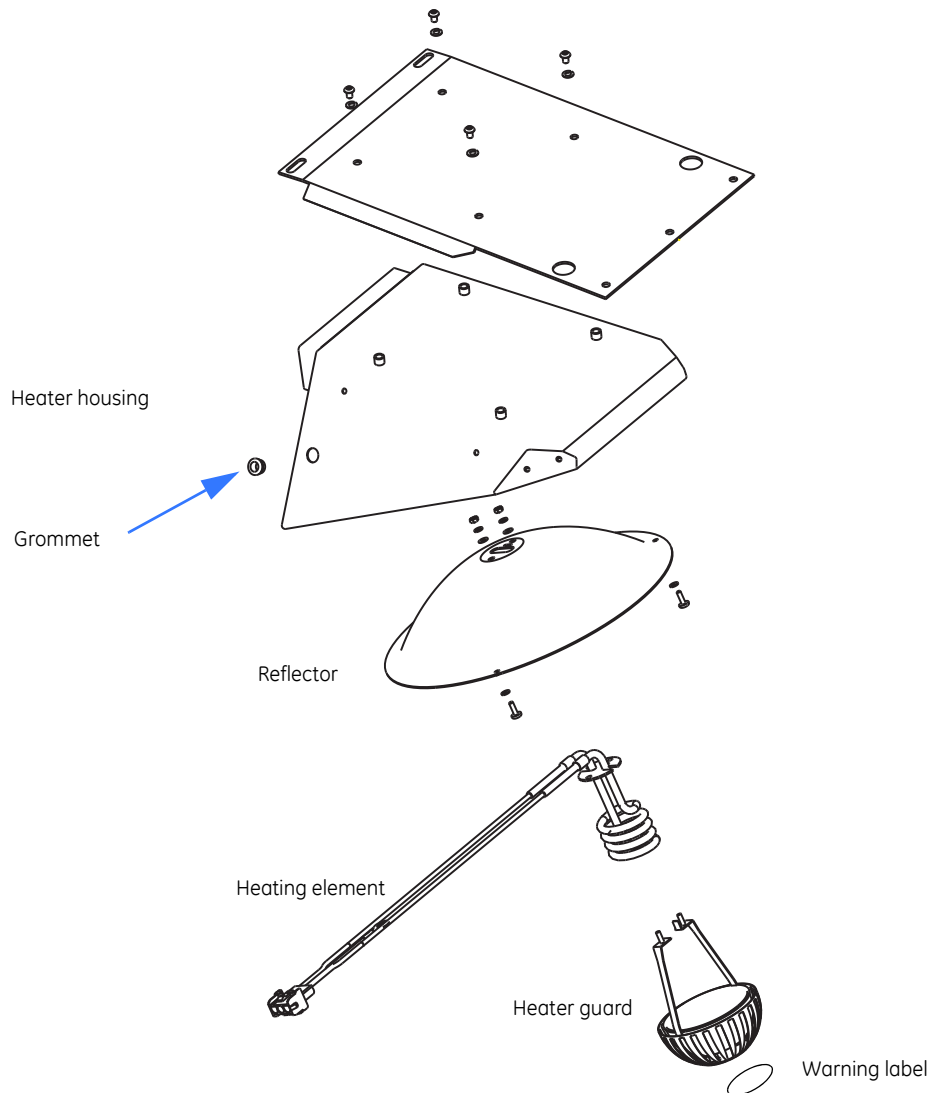
Refer to [“Figure 7-37 Canopy Alignment”](#).

There are four nuts and four nut-and-bolt sets that adjust canopy alignment. These require a 10 mm wrench and torque to approximately 81 inch-pounds.

1. Loosen all eight black canopy alignment nuts.
2. Manually lift the canopy to its highest adjustment position (so the studs in the canopy bracket are located at the bottom of the slots in the housing bracket). Tighten the top two alignment nuts on the housing bracket.
3. If necessary, plug in the power cord and switch on the device.
4. Use the canopy lower switch to lower the canopy until it reaches its bottom travel limit switch. This is indicated when the “In Transition” message appears on the Control panel.
5. Loosen the top two alignment nuts on the back plate to fully seat the canopy on the side panels. As a starting point, there should be an approximate 0.15 inch gap at each of the canopy corners. One way to shim up the corners, is to place a 2.5 mm hex key or a 3 mm hex key as spacers in either of the north canopy corners and a 4 mm hex key or a 5 mm hex key as spacers at either of the south canopy corners.
6. Retighten the top two alignment nuts on the housing bracket.
7. Tighten the remaining two nuts and four nut-and-bolt sets on the housing bracket.
8. Check alignment by raising and lowering the canopy. If the alignment is not satisfactory, loosen and retighten all eight alignment nuts with corner shims in place. Repeat until alignment is satisfactory.

## 7.6.2 Replacing the Radiant Heater

Refer to “Figure 7-1 Heater Housing Cover and Soffit” and “Figure 7-38 Radiant Heater Disassembly”.



**FIGURE 7-38. Radiant Heater Disassembly**

Before replacing the heating element, use an ohmmeter between the pins to determine if the heating element is the failed electrical component. A replacement heater kit includes heating element; heater leads with pins, and the connector and ground wire. You can replace the element with the canopy still assembled to the device by running the canopy to its top travel limit and lowering the elevating base to its lowest position.

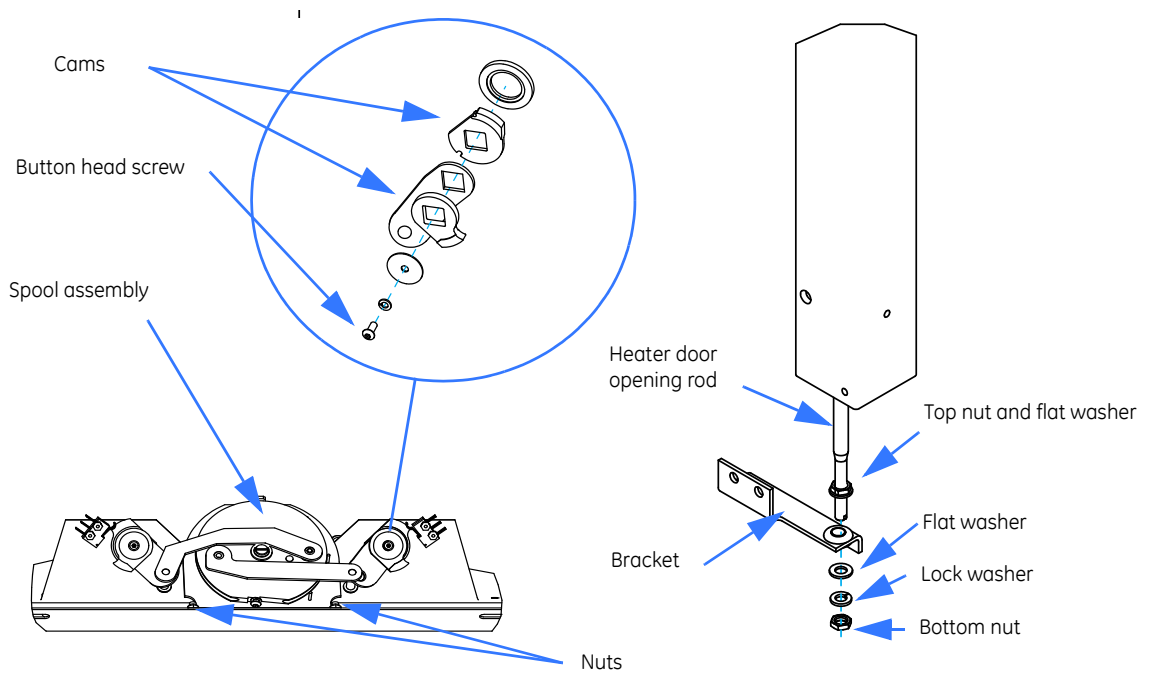
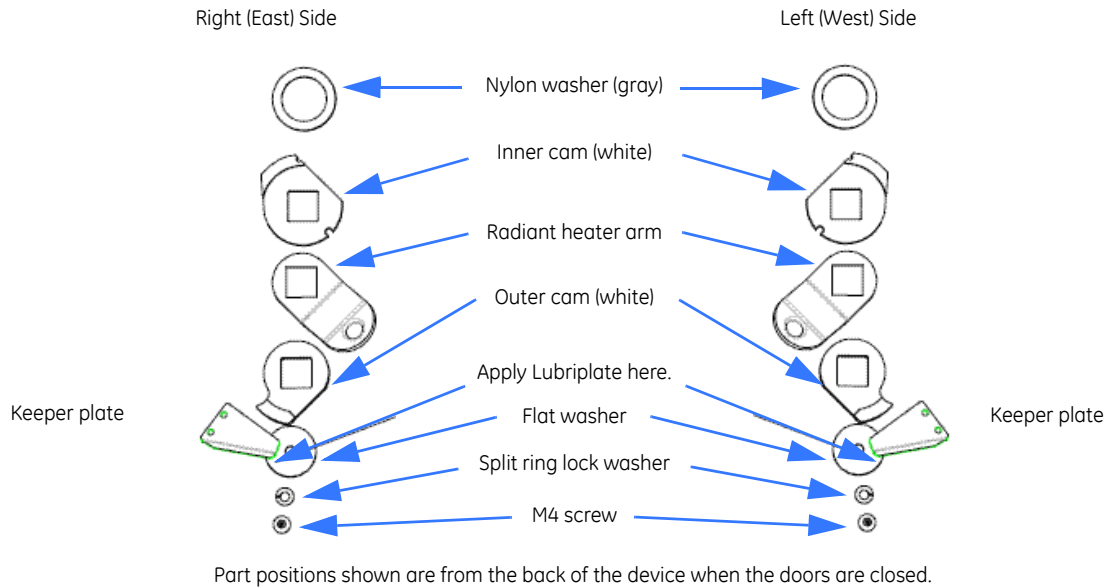
1. Using a small straight blade screwdriver, remove the 6 arrow clips that secure the soffit beneath the rear of the canopy and remove the soffit
2. Remove the 4 screws that secure the heater housing cover to the heater bracket and remove the cover.
3. Using a 8 mm wrench, remove the nut and 2 lock washers that secure the ground wire. Cut the wires to the heater, and remove and discard the female half of the connector.

### Radiant Heater Assembly Repair Procedures

4. Remove the 2 screws and lock washers (2.5 mm hex key) that secure the reflector and remove the heater assembly.
5. Remove the 2 nuts and lock washers (5.5 mm wrench) from the back of the reflector and remove the heating element and heater guard.
6. Install the new heating element and reinstall the guard in the reflector. Thread the wires from the new heating element through the grommet in the heater housing.
7. Use the 2 mounting screws and lock washers to reinstall the reflector.
8. Mount the new female half of the connector in its mounting. Push the pins from the heating element into the connector. Route the ground wire straight up from the ground stud and secure it with the lock washers and nut. Push any slack in the heater wire into the housing.

### 7.6.3 Heater Door Spool Assembly

Refer to "Figure 7-39 Heater Door Cable Adjustment".



**FIGURE 7-39. Heater Door Cable Adjustment**

To access the heater door spool assembly first disassemble the canopy/heater from the device as described in "Removing the Canopy and Heater Assembly."

1. Remove the housing bracket from the heater assembly.
2. To replace the spool assembly, use a 2.5 mm hex key to remove the button head screw that secures the cams and door links. Then use an 8 mm wrench to remove the 2 nuts that hold the spool.

### Radiant Heater Assembly Repair Procedures

3. To replace the door cable, use a flat screwdriver blade to pry the top tang (12 o'clock position) on the spool assembly and pull the cable off the spool toward you. Use a 2.5 mm hex key to separate the cable from the spool.

#### 7.6.4 Heater Door Cable Adjustment

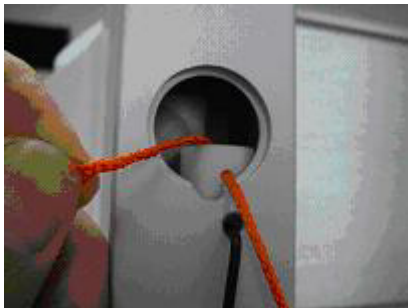
Refer to “[Figure 7-39 Heater Door Cable Adjustment](#)”.

1. The bottom end cap on the right side upright should be removed. Position the top nut and flat washer so the bottom of the flat washer is in the middle of the threads. Slide the heater door opening rod through the bracket, then install the flat washer, lock washer, and nut (8 mm wrench).
2. Use a straight blade screwdriver in the slot at the cable rod's end to hold the rod and use the wrench to tighten the bottom nut.
3. Turn on the device and run the canopy to its upper travel limit, and verify that both doors fully open.

#### 7.6.5 Spring Tube Assembly Replacement

For an exploded view of the spring tube assembly, refer to section [8.13](#).

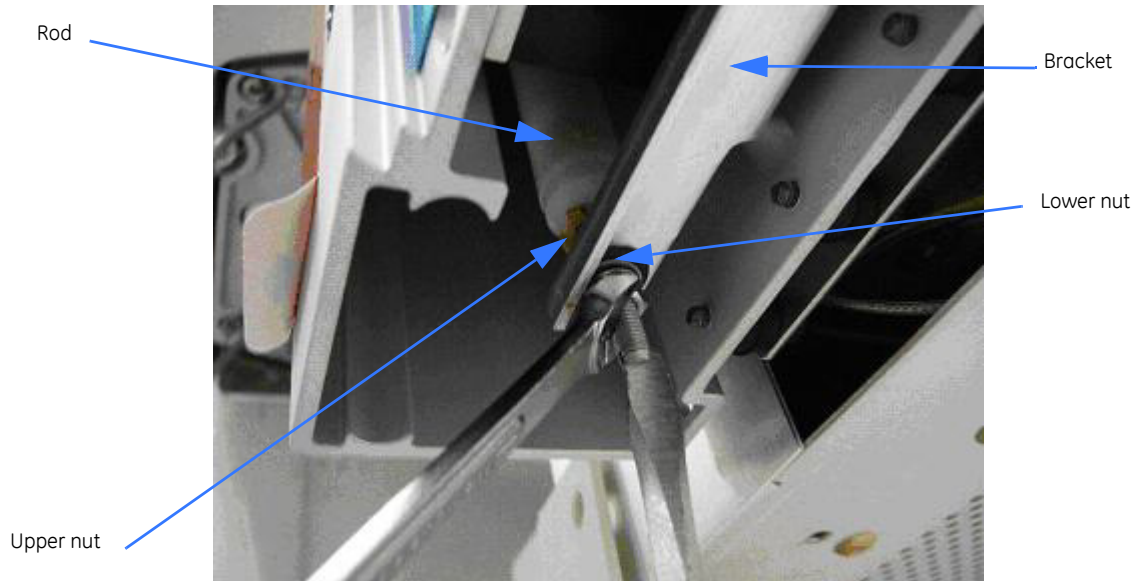
1. Elevate the elevating base to the upper limit of travel.
2. Elevate the canopy to the service position, about halfway up so that the black oxide shipping screw is centered in the horizontal slot, which is about midway up on the outside of the dovetail rail.
3. Turn off the device and unplug it from the wall.
4. Slide up the decorative strip in the dovetail rail slot to expose lower end cap screw. (A piece of adhesive tape on the decorative strip can help to move it.)
5. Remove the lower end cap.
6. Remove the hole plug from the back of East lift rail. (Refer to “[Figure 7-22 Disconnecting Heater Door Cable](#)”.)
7. Rotate the spring tube assembly until the setscrew hole and lower securing hole are visible from the access hole in the back of the inner rail. Insert a 2 mm hex wrench through the small hole in the back of the inner rail through the spring tube and back into the rail to temporarily secure the spring tube assembly to the inner rail.
8. Unscrew the setscrew in the door cable conical cap until it is possible to separate the door cable cap from the spring tube. Do not remove the setscrew.
9. Secure a length of string to the cross-hole in the spring tube. The string should be long enough to allow the spring tube to be removed from the bottom of the rail assembly. Firmly secure the other end of the string. This string will be used to lift the new spring tube assembly into place.



**FIGURE 7-40. Securing String to the Spring Tube**

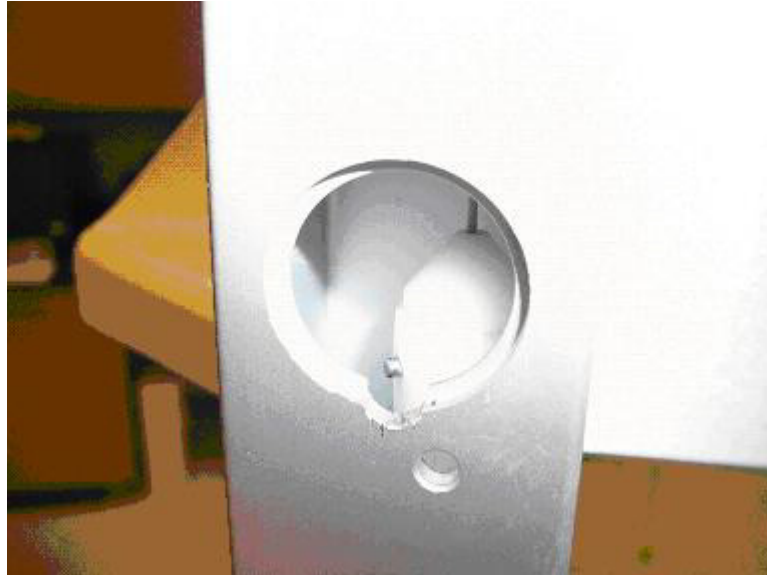


10. Remove the wrench from the cross hole in the spring tube and lower the tube to the bottom of travel with the string.
11. Remove the lower M5 nut from the spring tube assembly at the bottom of the rail.



**FIGURE 7-41. Removal of the Lower M5 Nut**

12. Lift the rod out of the bracket.
13. Lower the spring tube assembly out of the rail assembly.
14. Remove the string from the old spring tube assembly and secure it to the new spring tube assembly.
15. Thread the new spring tube assembly into the rail assembly by raising it with the string.
16. Insert and secure the rod in the bracket. Position the opposing M5 nuts so that the bracket is approximately halfway up the threaded section of the rod. (Refer to ["Figure 7-39 Heater Door Cable Adjustment"](#).)
17. Using the string, pull the spring tube up until a 2 mm hex wrench can be inserted through the inner rail and spring tube, temporarily securing the spring tube. Check that hex wrench is fully inserted in the hole in the opposite side of the inner rail.
18. Remove the string.
19. Re-secure the heater door cable end cap by screwing in the setscrew with a 2 mm wrench. Moderate tightening is correct.
20. Verify that the door cable is securely held in the spring tube by pulling on the cable.
21. Remove the hex wrench that was temporarily securing the spring tube to the inner rail. Allow the spring tube to hang on the cable.
22. Check that the dog point of the set screw, opposite the hex wrench, is protruding slightly from the spring tube.



**FIGURE 7-42. Dog Point of the Set Screw**

If it is not, re-insert the securing wrench and retighten the set screw.

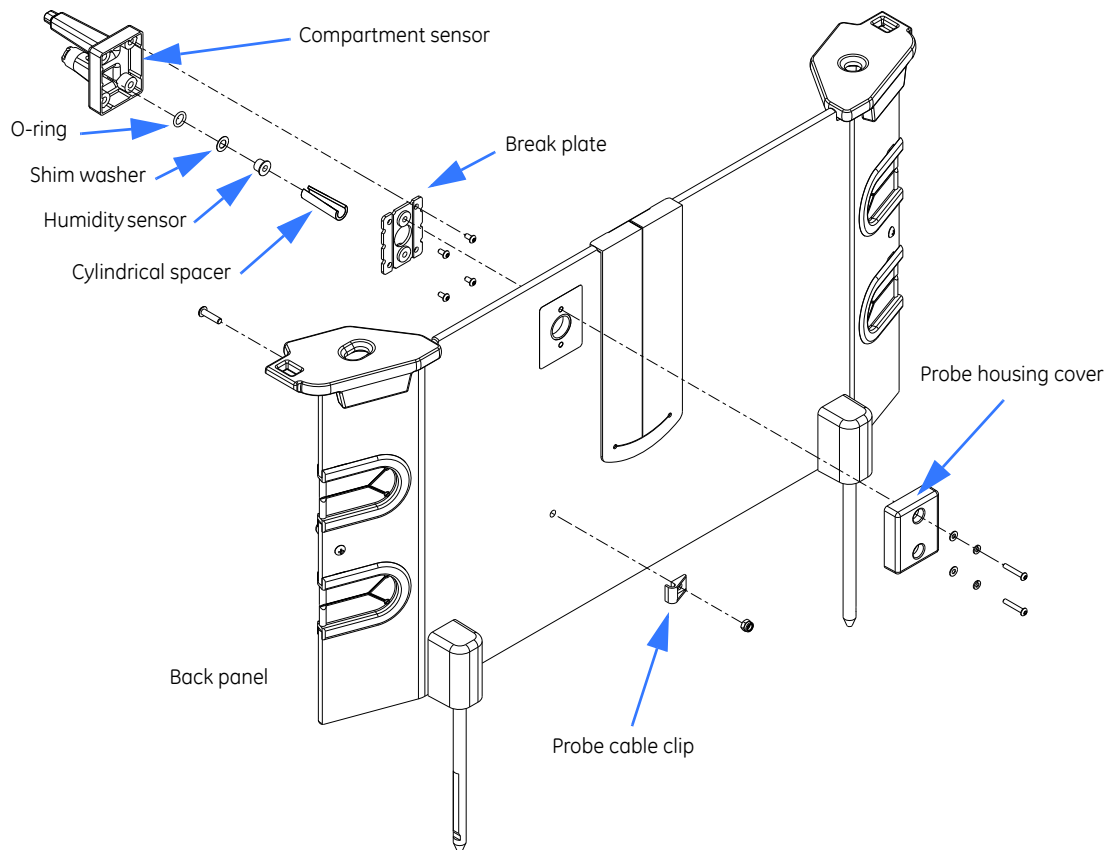
23. Re-install the hole plug.
24. Ensure that the opposing M5 nuts on the rod are tightened to the bracket. (Refer to “[Figure 7-41 Removal of the Lower M5 Nut](#)”.)
25. Plug the device in and turn it on.
26. Raise the canopy to the upper position. Ensure that the heater doors open and the “IN TRANSITION” message is not shown. (Refer to section [7.6.4](#).)
  - If the heater doors do not open all the way so the “IN TRANSITION” message still shows, loosen, adjust the rod down relative to the bracket and re-tighten.
  - If the heater doors are all the way open against their mechanical stop and the “IN TRANSITION” message still shows, loosen and adjust the rod up relative to the bracket.

The least amount of tension that fully opens the doors is preferred.

27. Lower the canopy. Ensure that the canopy closes completely.
28. Reinstall the lower end cap. Reposition the appearance strip to cover the end cap screw.
29. Cycle the canopy up and down several times to verify operation.
30. Perform the complete pre-use checkout before returning the device to service. For instructions, refer to [Chapter 2](#).

## 7.7 Compartment Sensor Repairs

Refer to "Figure 7-43 Compartment Sensor Disassembly".

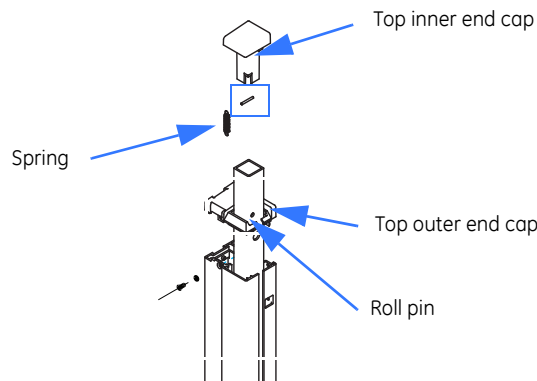


**FIGURE 7-43. Compartment Sensor Disassembly**

1. Using a 2.5 mm hex key, remove the screw that secures the probe cable clip to the back panel.
  2. Remove the 2 screws (2 mm hex key) that secure the probe housing cover and remove it.
  3. Disconnect the connectors for the temperature and humidity sensor (if installed) wires and remove the compartment sensor.
  4. Feed the probe cable through the hole in the back panel and remove the front of the probe housing.
  5. Remove the 4 screws in the break plate and remove the plate.
  6. To replace humidity sensor, pull it back out of the probe housing. Slide the wires out of the cylindrical spacer. Place the shim washer and then the O-ring over the tip of the new sensor, and gently push it back into the housing using the cylindrical spacer until the O-ring seats. The sensor tip should be visible, but not protruding from the housing or up against its guard. Check to ensure that the O-ring did not roll over the sensor flange during insertion.
- Note:** Perform the Humidity Calibration after replacing the humidity sensor.
7. To replace the temperature sensor, you must replace the entire probe housing.
  8. When reassembling the probe housing make sure the groove in the break plate faces the probe housing cover. Also check that the temperature sensor is oriented so that it is on top.

## 7.8 Removing the Upper End Cap Spring

Refer to "Figure 7-44 Top Rail End Cap".



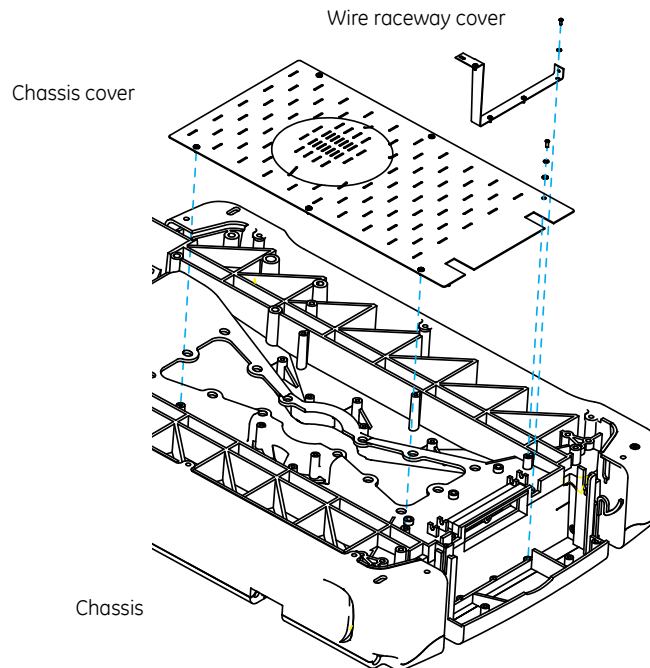
**FIGURE 7-44. Top Rail End Cap**

1. To replace the retaining spring, use a punch to push the roll pin in the top of the lift rail out about  $\frac{1}{4}$  inch and remove the old spring.
2. Remove the old spring from the end cap.
3. Use a needle nose pliers to hook one end of the new spring onto the roll pin.
4. Push the roll pin back into the rail with the new spring attached.
5. Hook the other end of the new spring with a 1.5 or 2 mm "long" hex key and stretch it up into the shaft of the end cap. Hook it on the roll pin inside the end cap shaft.

## 7.9 Lower Device Repairs

### 7.9.1 Removing the Chassis Cover with the Storage Drawer in Place

Refer to “Figure 7-45 Chassis Bottom Cover”.



**FIGURE 7-45. Chassis Bottom Cover**

**Note:** It is not necessary to remove the storage drawer before removing the chassis cover, but you may wish to remove it to provide easier access to the chassis cover.

1. Remove the humidifier reservoir.
2. Slide the drawer all the way over in one direction, and use a 2.5 mm hex key to remove the 3 chassis cover screws on one side.
3. Slide the drawer to the other side and remove the 3 remaining screws from the cover.
4. Remove the bottom 2 screws (2 mm hex key) that secure the right end of the humidifier wire raceway cover.
5. Flex the raceway cover and carefully slide the cover panel forward until it drops off the back drawer slide.
6. Rotate the cover slightly and push it out the right side of the device.
7. Remove the ground wire.

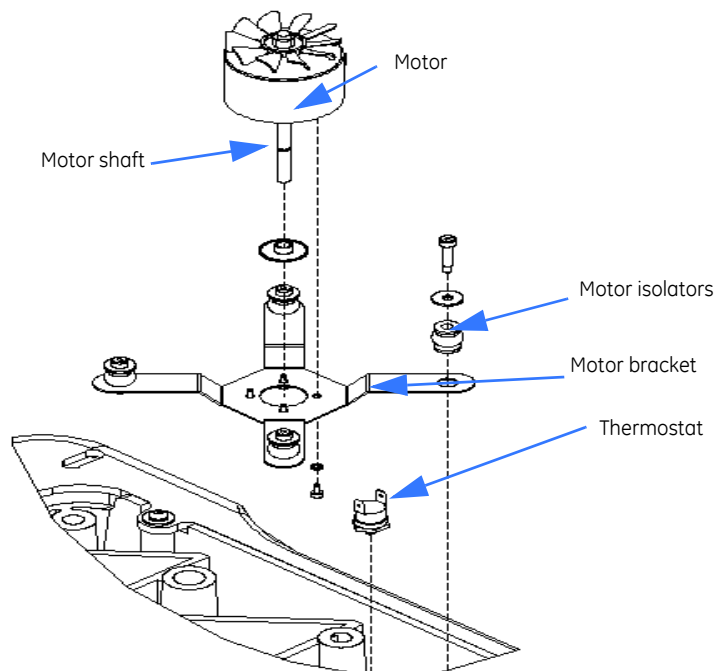


FIGURE 7-46. Fan Motor

## 7.9.2 Incubator Fan, Fan Motor, and Optical Fan Sensor

Refer to “[Figure 7-48 Bed Disassembly](#)”, “[Figure 7-47 Heat Sink and Fan](#)”, and “[Figure 7-46 Fan Motor](#)”.

1. Remove the rotating bed, translation deck, tilt platform, and pan.
2. Remove the fan, fan hub, and fan seal from the top of the fan motor shaft.
3. Remove the chassis cover. (Refer to “[Removing the Chassis Cover with the Storage Drawer in Place](#)” on page 7-45.)
4. Disconnect the motor leads.
5. Remove the 4 screws in the motor bracket and remove the fan motor assembly.
6. The motor isolators pop out of the holes in the bracket.

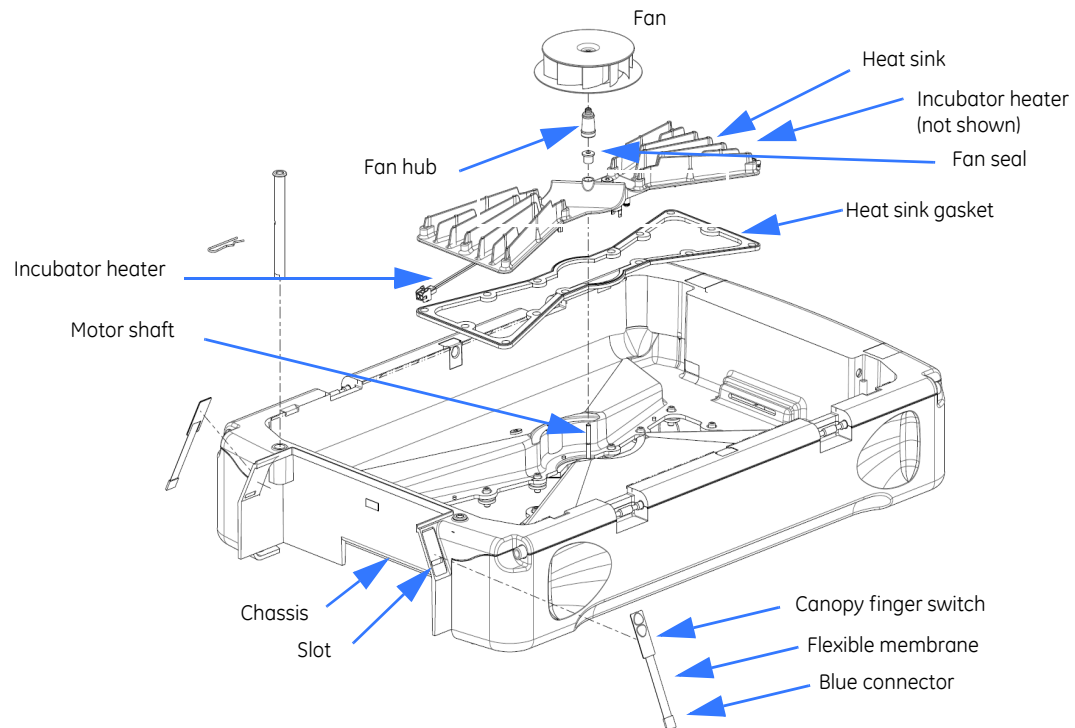


**Caution:** To avoid damaging a harness, make sure you do not pull the harness by the cable wires. Instead, use the connector body to disengage or to engage the connectors.

7. To replace the optical sensor, disconnect its connector, remove the screw from the boss in the chassis that holds it in place, and remove the assembly.

### 7.9.3 Incubator Heater Replacement

Refer to “Figure 7-47 Heat Sink and Fan”, and “Figure 8-14 Upper Chassis”.



**FIGURE 7-47. Heat Sink and Fan**

Before disconnecting the power, raise the bed to a comfortable working height.

#### 7.9.3.1 Removing the Incubator Heater Closest to the Humidifier End of the Bed

1. Remove the chassis cover. (Refer to “Removing the Chassis Cover with the Storage Drawer in Place” on page 7-45.)
2. Remove the screw (4 mm hex key) in the heatsink directly in front of the heater cartridge.
3. Disconnect the heater’s electrical connector.
4. Remove the retaining clip and slide the heater out of the heat sink.

#### 7.9.3.2 Removing the Incubator Heater Closest to the Control Panel End of the Bed

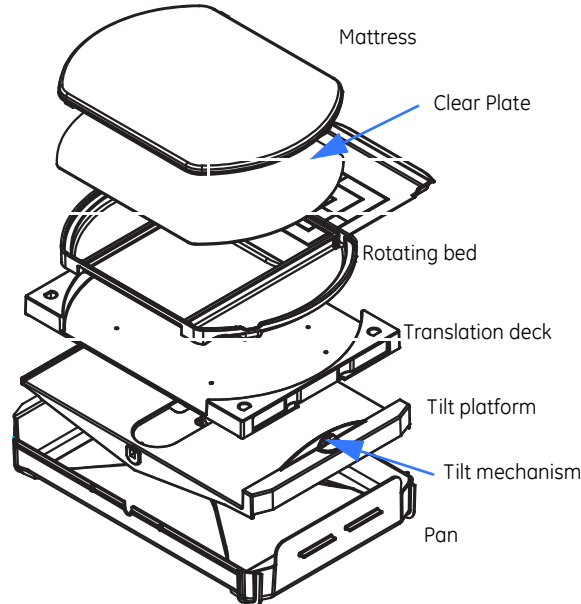
1. Remove the rotating bed, translation deck, tilt platform, and pan.
2. Remove the fan, fan hub, and fan seal from the top of the fan motor shaft.
3. Remove the chassis cover. (Refer to “Removing the Chassis Cover with the Storage Drawer in Place” on page 7-45.)
4. Disconnect the heater’s electrical connector, the thermostat connections and the heat sink sensor connector.
5. Remove the upper shroud.

### Lower Device Repairs

6. Remove the 14 mounting screws that secure the heat sink. Remove the heatsink.
7. Remove the retaining clip and slide the cartridge out of the heat sink.
8. To reassemble, seat the fan seal in the center bore of the heatsink and use it to align the fan shaft before fully securing the heat sink with its mounting screws. It may be necessary to wet the fan hub to allow it to slide all the way onto the fan shaft and seat properly.

### 7.9.4 Elevating Base

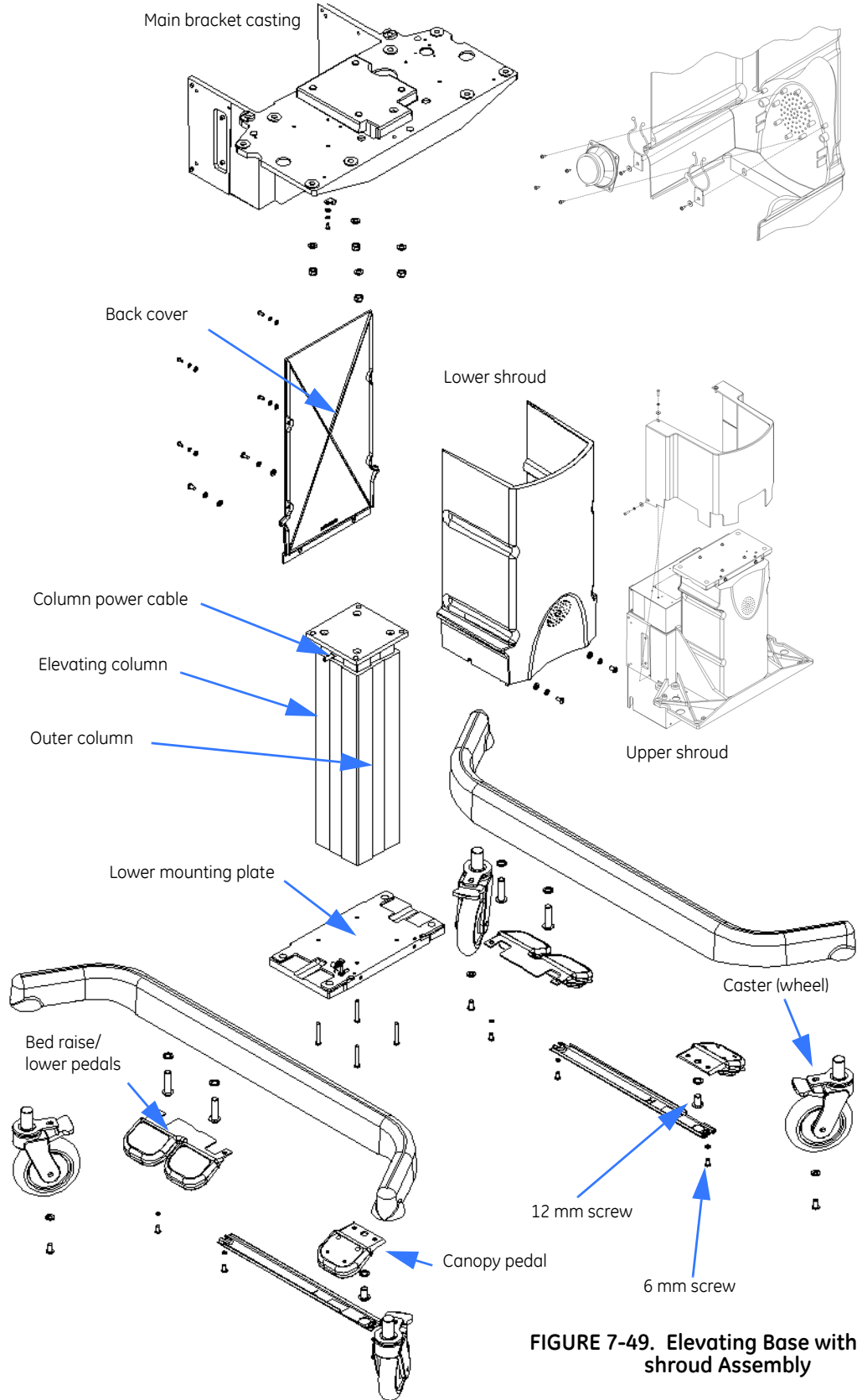
Refer to “Figure 7-48 Bed Disassembly”.



**FIGURE 7-48. Bed Disassembly**

1. Run the elevating base to its top travel limit.
2. Remove the mattress, bed, translation deck, tilt platform, and pan.
3. Run the canopy to its lowest position (closed). Use the shipping locks (Figure 5-14) to lock the canopy in the down position.
4. Switch off and unplug the device.
5. Remove the chassis cover. (Refer to “Removing the Chassis Cover with the Storage Drawer in Place” on page 7-45.)
6. Disconnect the elevating base electrical connector at J-45 on the relay board, and tie a wire to it so you can fish it back through during reassembly.
7. Connect the replacement elevating base to the relay board, switch the device back on and using the bed raise/lower pedals fully extend the new base. Switch off and unplug the device.





**FIGURE 7-49. Elevating Base with Three-shroud Assembly**

### Lower Device Repairs

8. Use a 2.5 mm hex wrench to remove four M4 flat washers, four M4 split lock washers, and four M4x10 button head socket cap screws, that attach the back cover shroud to the lower shroud.
9. Use a 4 mm hex wrench to remove two M6 flat washers, two M6 split lock washers, and two M6x12 button head screws, that attach the back cover shroud to the base plate.
10. Use a 4 mm hex wrench to remove two M6 flat washers, two M6 split lock washers, and two M6x12 button head screws, that attach the lower shroud to the base plate.
11. Using 3 mm hex key remove the screws that secure the upper shroud. Remove four screws. Remove the upper shroud.
12. Pull the base wire harness out from the bracket casting.
13. Lock the back wheels and lay the device down on its back (control panel on the floor). Place blocks under the uprights so the back wheels are off the floor.
14. Using a 4 mm hex key, remove the four socket head screws in the bottom of the elevating base that secure the lower mounting plate to the base, and remove the mounting plate/leg assembly.
15. Using a 13 mm socket, remove the 4 nuts that secure the elevating base to the casting and remove the base.

**Note:** Should the elevating base fail in the completely retracted position, the outer column will prevent access to the 4 base mounting nuts. To remove the outer base, you must first remove the lower mounting plate and slide the outer column out. This requires a T-30 Torx key (service tool number 6600-1204-400)

16. To replace the elevating base, reverse the assembly steps above. Check that the wheels are still locked before lifting the device back into its upright position. If you are returning the old elevating base in its original packaging, attach it to the relay board and run it down to its fully retracted position. Release the shipping locks.

**Note:** With the device on its back, be sure the base power cable is pointing up before you attach the base.

### 7.9.5 Chassis Replacement

Refer to “[Figure 7-48 Bed Disassembly](#)”, “[Figure 7-47 Heat Sink and Fan](#)”, “[Figure 7-46 Fan Motor](#)”, “[Figure 7-45 Chassis Bottom Cover](#)”.

1. Remove the bed sides, rotating bed, translation deck, tilt platform and pan.
2. Disconnect the compartment probe from the probe panel.
3. Remove the bottom chassis cover. (Refer to “[Removing the Chassis Cover with the Storage Drawer in Place](#)” on page 7-45.) Remove the two side chassis covers (3 mm hex key).
4. Remove the front panel.
5. Disconnect the wiring harnesses.
6. Remove the two screws at the bottom corners that secure the probe panel to the enclosure. (Refer to section [7.13.1](#).)



**Warning:** Be sure the front of the chassis is supported before removing the screws from the bracket to prevent the chassis from falling.

---

7. While supporting the chassis, remove the 5 bolts on either side of the bracket casting that secure the chassis to the bracket and remove the chassis.
8. Remove all the components from the old chassis (bed tilt; fan and motor; heatsink; humidifier; etc.) and install them on the new chassis.

### 7.9.6 Bed Raise/Lower Pedal Switch

1. Run the bed up to the elevating base's top travel limit. Power down the device and unplug it.
2. Use a 2.5 mm hex wrench to remove four M4 flat washers, four M4 split lock washers, and four M4x10 button head socket cap screws, that attach the back cover shroud to the lower shroud.
3. Use a 4 mm hex wrench to remove two M6 flat washers, two M6 split lock washers, and two M6x12 button head screws, that attach the back cover shroud to the base plate.
4. Use a 4 mm hex wrench to remove two M6 flat washers, two M6 split lock washers, and two M6x12 button head screws, that attach the lower shroud to the base plate.
5. Make note of the switches' electrical wire routing; the cable from the replacement switch must feed up through the same slot.
6. Using a 4 mm hex key, remove the button head socket screws on either side of the bed raise/lower pedal switch, located between the elevating base plate and the leg wire cover.
7. Disconnect the switch electrical connector and pull the switch out. Discard old bed raise/lower pedal switch.
8. Install new bed raise/lower pedal switch. Make sure that you do not pinch the electrical wires.

### 7.9.7 Canopy Foot Pedal Switch

1. Using a 4 mm hex key and a 8 mm hex key, remove the screws that secures the canopy foot pedal.
2. Disconnect the switch electrical connector and pull the pedal out . Discard old canopy foot pedal switch.
3. Install new canopy foot pedal switch. Replace the 12 mm screw first, then the 6 mm screw. Make sure that you do not pinch the electrical wires.

### 7.9.8 Canopy Membrane Switch Replacement

Refer to "Figure 7-47 Heat Sink and Fan".

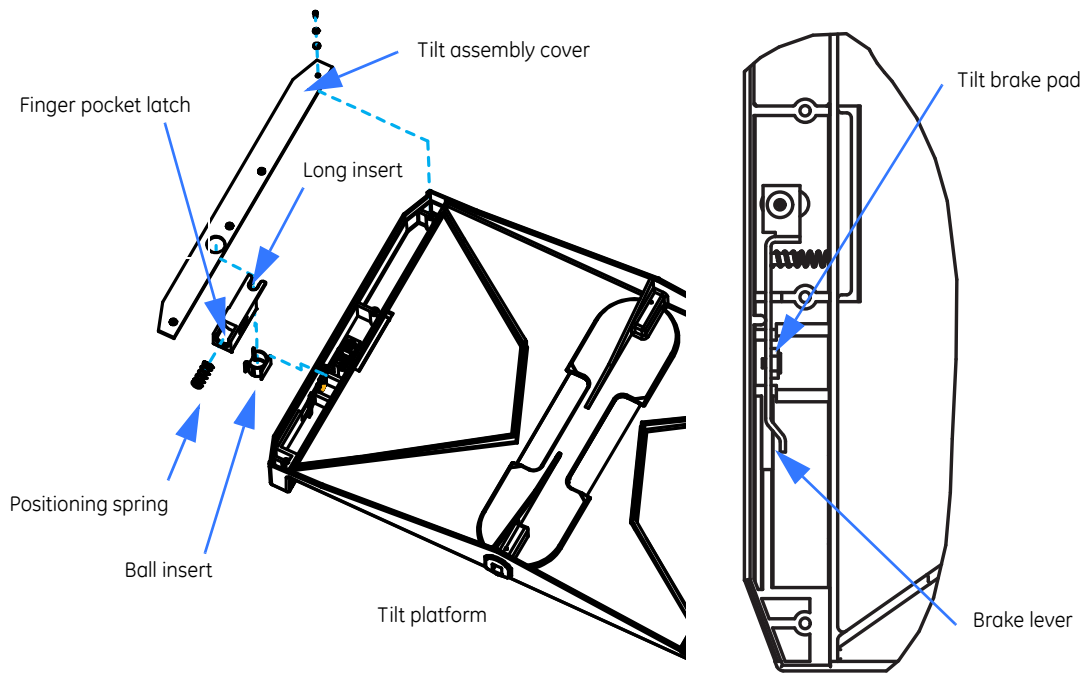
1. Adjust the elevating base to comfortable working height.
2. Remove the electronics enclosure cover.
3. Remove the two screws holding the probe panel housing to the electronics enclosure.
4. Rock the probe panel housing forward and up, allowing access to the gray membrane switch wiring harness.
5. Gently pull the gray wire harness up, this will pull up the membrane switch/harness connection, allowing you access to the connector.
6. Disconnect the membrane switch. If you intend to replace the plastic adhesive connector locking pieces, you can discard the old ones. Otherwise, save the plastic adhesive connector locking pieces to reinstall with the new membrane switch.
7. Remove the old membrane switch, pulling the connector through the slot in the chassis. (The blue connector may pull off the old/damaged membrane switch, but it will drop through to the floor.)
8. Clean the old switch adhesive from the chassis.
9. Feed the new membrane switch connector through the slot. Do not attach/stick the new membrane switch to the chassis yet.
10. Use a piece of heavy wire to fish the blue connector of the new membrane switch up from behind the switch panel so that you can connect it to the black connector of the gray membrane switch wiring harness.

## Bed Tilt Brake Pad Replacement

11. Connect the blue and black connectors. Secure the connection using the plastic adhesive connector locking pieces that you saved in step 6 or a new one (part number 6600-0572-600).
12. Tuck the connector assembly down between the chassis and the electronics enclosure.
13. Remove the adhesive backing on the new membrane switch and attach it to the chassis.
14. Replace the probe panel housing in its correct position.
15. Replace the two screws holding the probe panel housing to the electronics enclosure.
16. Replace the electronics enclosure cover.
17. Perform the post-service checkout including electrical safety.

### 7.10 Bed Tilt Brake Pad Replacement

Refer to “Figure 7-48 Bed Disassembly” and “Figure 7-50 Replacing the Tilt Brake Pad”.



**FIGURE 7-50. Replacing the Tilt Brake Pad**

1. Remove the mattress, clear plate, rotating bed and translation deck.
2. To release the tilt screw ball, squeeze the tilt mechanism and slide open the finger pocket latch until you hear the ball drop.
3. Release the tilt platform from the chassis by pushing the pivot pin tabs in on both sides, then lifting the tilt platform out of the chassis.
4. Turn the tilt platform over and remove the 4 screws (2.5 mm hex key) that secure the tilt assembly cover.
5. Remove the two plastic inserts. The long insert holds a positioning spring and the smaller ball insert holds the screw ball in position.
6. Press back the brake lever to provide access to the tilt brake pad, then use pliers or a thin 14 mm open end wrench to remove the nut to which the brake pad is fastened. Replace the tilt brake pad assembly and reassemble.

## 7.11 Wheel Replacement

Refer to “Figure 7-49 Elevating Base with Three-shroud Assembly”.

The wheels may be replaced with the device upright or carefully placed on its back. You may wish to lock the canopy in its shipping position.

1. Lock all the other wheels.
2. Lift the wheel off the floor and use blocks to support the leg near the wheel you are replacing.
3. Remove the screw, which holds the wheel beneath the leg casting then remove the wheel.
4. Install the replacement wheel then secure the wheel to the leg by tightening the screw through the wheel plate into the threaded hole in the bottom of the leg.

## 7.12 Humidifier Assembly Repairs

Refer to “Figure 7-45 Chassis Bottom Cover” and “Figure 7-51 Humidifier Parts”.

Qty. per Assy.	Description	Part Number
3	Screw, M3 X 8, Phillips head, Teflon coated	6600-1255-401
4	Screw, M3 X 10, Phillips head, Teflon coated	6600-1255-402
4	Screw, M3 X 12, Phillips head	6600-1255-403
2	Screw, M3 X 16, Phillips head	6600-1255-404
4	Spacer, .125 ID	6600-1779-500
1	Ramp block	6600-1777-500
1	Heater mount	6600-1291-500
1	Button, reservoir switch	6600-1298-500

### 7.12.1 Disassembly

1. Remove the humidifier reservoir.
2. Remove the 6 screws that secure the wire raceway cover and remove the cover.
3. Remove the chassis cover. (Refer to “Removing the Chassis Cover with the Storage Drawer in Place” on page 7-45.)
4. Disconnect the 3 electrical connectors.
5. Remove the 2 screws on either side of the heater assembly.
6. Remove the heater assembly.
7. Use a 2 mm hex key to remove the 2 screws from the reservoir switch and remove the switch.
8. Remove the 4 screws that secure the top bracket. Back the bracket off feeding the wire harnesses through as you remove it.
9. Remove the top gasket, feeding the wire harnesses through as you remove it. The thermostat wire harness can slide through the slots in the gasket.
10. Remove the 4 screws in the heater mount and remove the bottom bracket.
11. Remove the socket head cap screw next to the add water thermostat, then remove the bottom gasket, insulating cylinder, and protective insert.

Humidifier Assembly Repairs

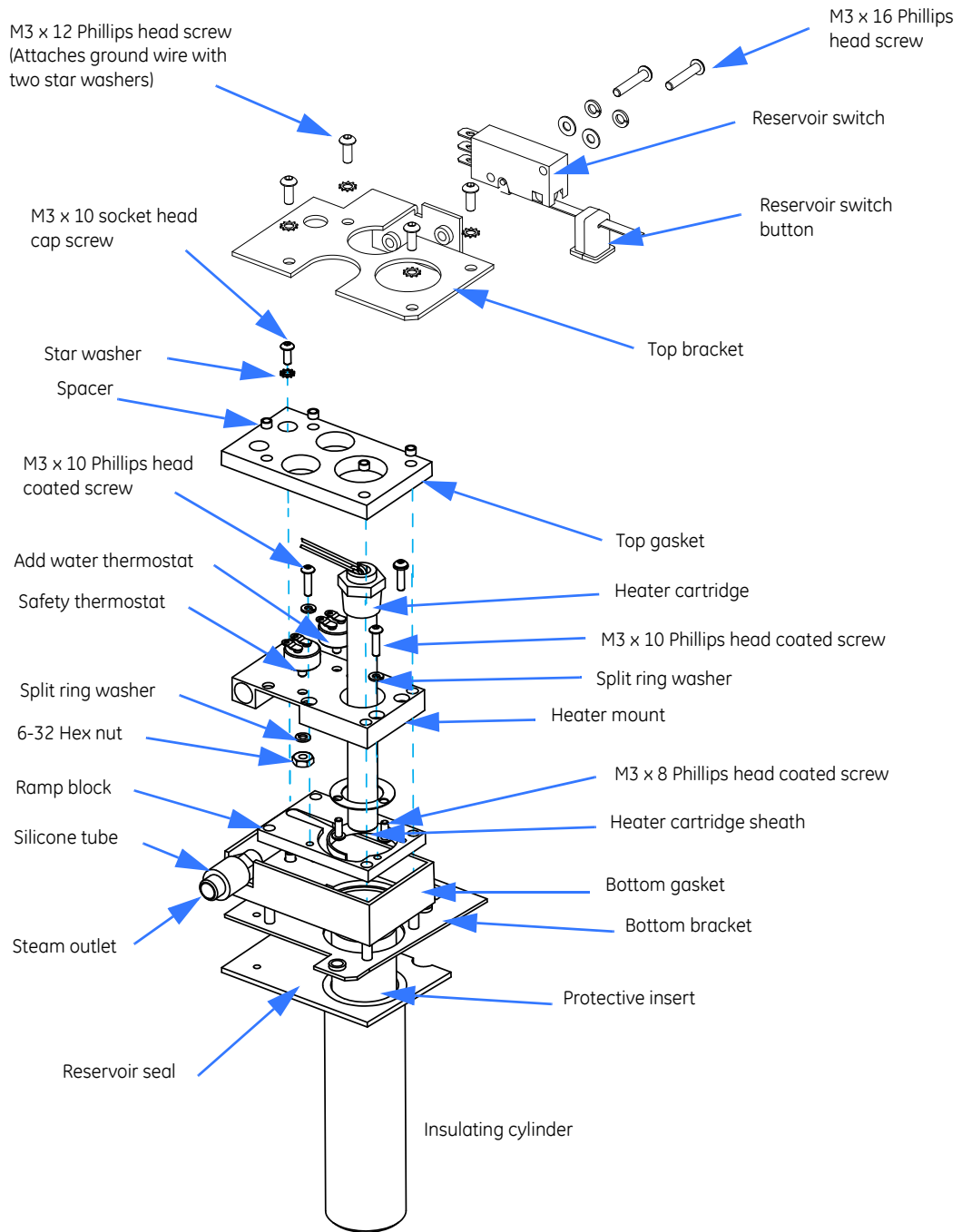


FIGURE 7-51. Humidifier Parts

12. Remove the 3 screws in the heater cartridge sheath.
13. To remove the heater cartridge, unscrew it from its threaded hole.
14. The thermostats can be replaced by removing the nuts securing them to the ramp block.

**Note:** If either thermostat or the heater cartridge is being replaced, check all components (especially the plastic ones) for signs of heat damage or corrosion. We recommend replacing the sheath when replacing the heater cartridge.

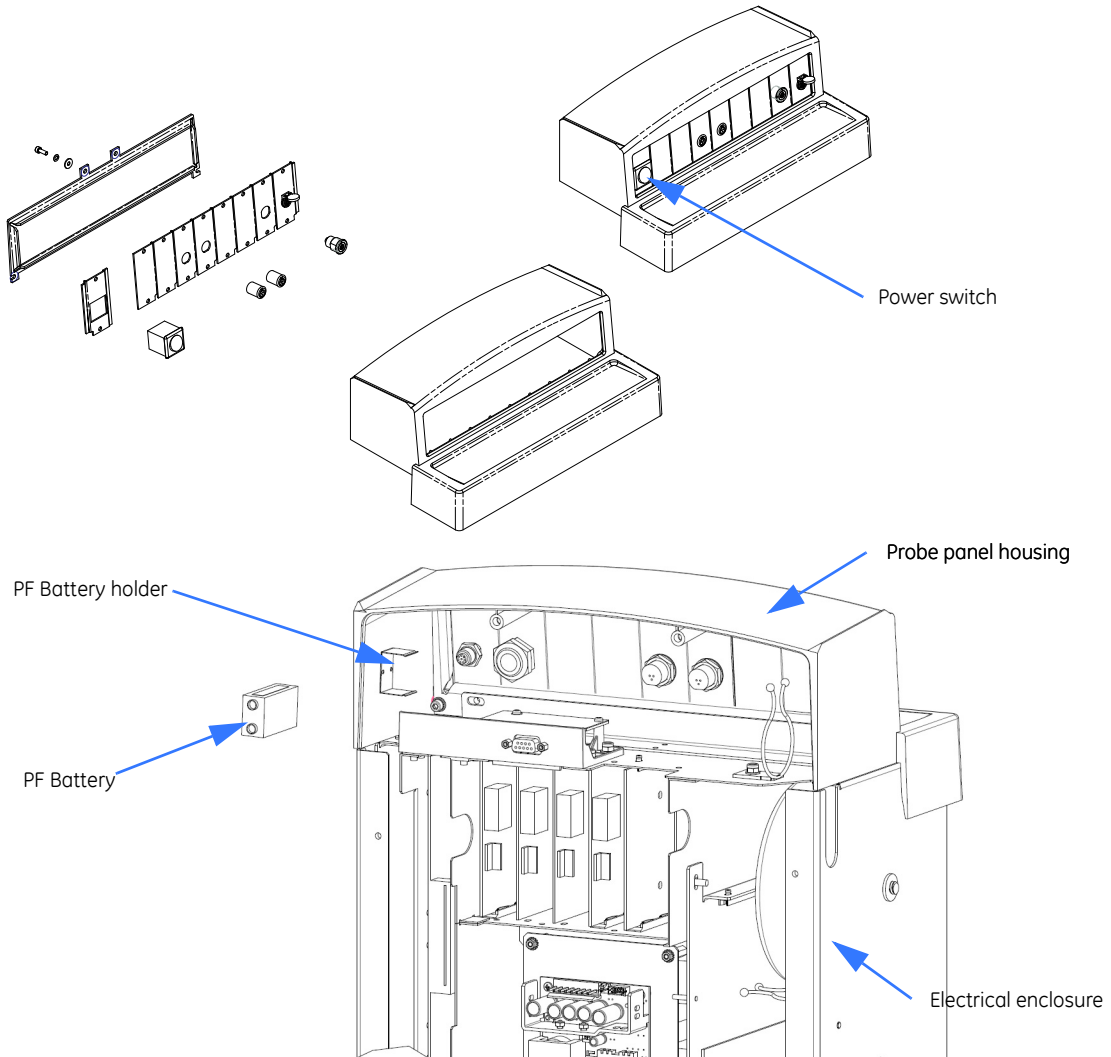
### 7.12.2 Reassembly

1. Screw the steam outlet in the threaded hole on the heater mount.
2. Slide the silicone tube on the steam outlet flush to the hex.
3. Screw the heater cartridge assembly into the heater mount, then back it off so the harness exits between the two thermostat mounting holes.
4. Attach the heater sheath with the three M3 x 8 Phillips Teflon coated screws and split ring lock washers to the bottom of the heater mount.
5. Place two M3 x 10 Phillips Teflon coated screws and split ring lock washers into the heater mount counter bore holes next to the thermostat mounting holes.
6. Attach the two thermostats to the mounting block with the 6-32 hex nuts and split ring lock washers, being careful not to position the thermostat wires over the mounting holes in the heater mount. The add water thermostat has the micro-switch attached to the harness.
7. Attach the ramp block to the heater mount with the two screws placed in the counter bore holes above, and with two additional M3 x 10 Phillips Teflon coated screws and split ring lock washers.
8. Place the protective insert inside the insulating cylinder. Slide the bottom gasket over the insulating cylinder then over the ramp block.
9. Align and slide the posts of the bottom bracket through the bottom gasket, then through the ramp block.
10. Install an M3 x 10 socket head cap screw and star washer through the hole in the heater mount next to the add water thermostat. This screw grounds the bottom bracket so do not use a Teflon coated screw.
11. Route the heater and thermostat wire harnesses through the top gasket.
12. Install the top gasket and place the 4 0.125ID x 0.107L spacers into the gasket holes.
13. Route the heater and thermostat wire harnesses through the holes in the top bracket.
14. Install the reservoir switch button up through the bottom bracket and slide the switch actuator lever through the button slot.
15. Attach the reservoir switch to the top bracket using the two M3 x 16 Phillips screws, flat washers, and split ring lock washers.
16. Align the top bracket with the mounting holes and install the four M3 x 12 Phillips screws and star washers through the 4 holes in the top bracket. Attach the ground wire to the screw closest to the switch, using two star washers.
17. Dress the wire harnesses and install a cable tie.
18. Slide the reservoir seal into place.
19. When installing the humidifier assembly, rotate the cylinder so the max line is visible.

## 7.13 Control Panel and Display Module Procedures

### 7.13.1 Probe Panel

Refer to “Figure 7-52 Probe Panel” and “Figure 8-1 Probe Panel Assembly”.



**FIGURE 7-52. Probe Panel**



1. Using a 2.5 mm hex key, loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the control panel cover, then remove the cover. Disconnect the wire harnesses coming from the probe panel.
2. Remove the 2 screws at the bottom corners that hold the probe panel to the enclosure.
3. Remove the probe panel assembly.
4. While tilting the panel enclosure forward, use a 3 mm hex key to remove the 4 screws that hold the panel frame in place. Add new connectors through the panel frame as appropriate.

**Note:** The power switch panel must be on the far left. The position of the remaining panels is not critical.



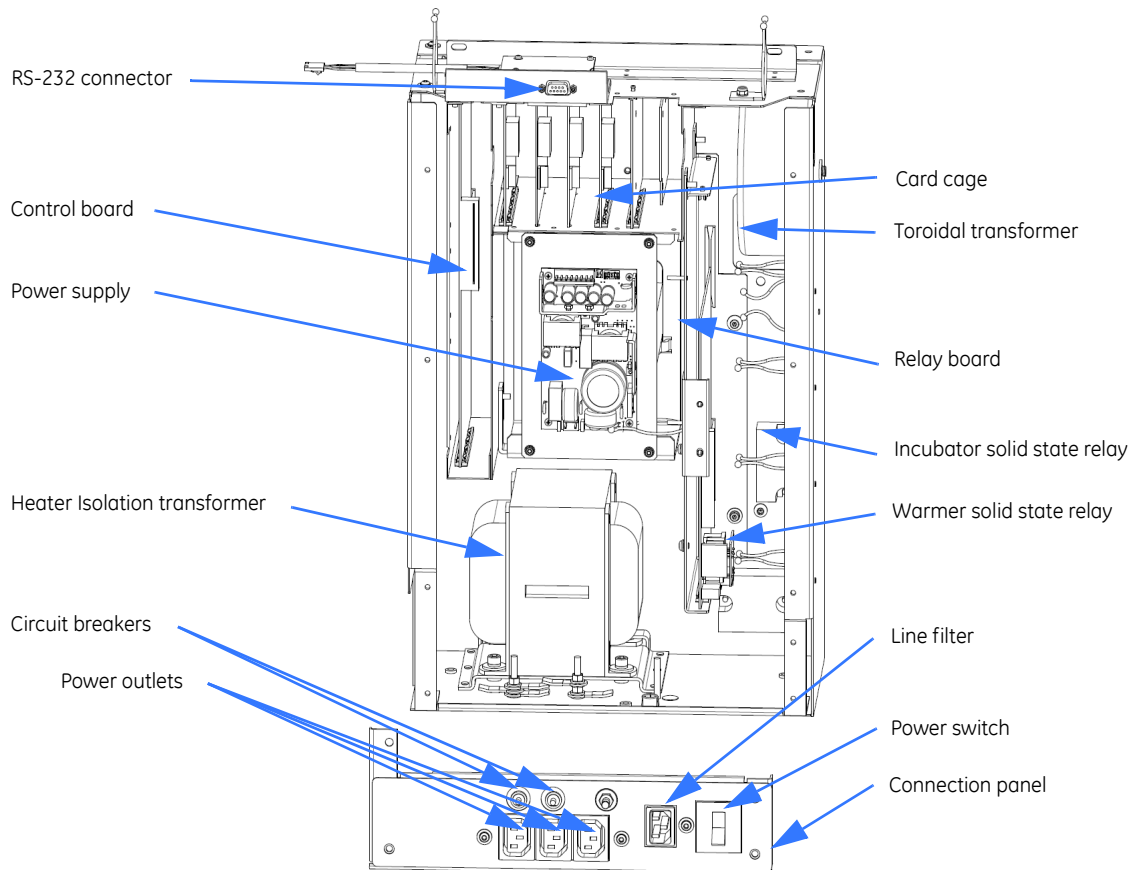
### 7.13.1.1 Power Fail Battery

The PF Battery snaps into a holder on the side of the probe panel housing. It has two snap connectors at its top. When replacing the battery, it's easier to first connect the terminals then push the battery into its holder.

**Note:** Run the device for at least two hours to charge the new battery before using the device. The PF Battery charges only when the device is powered on.

### 7.13.2 Control Panel Components

Refer to "Figure 7-53 Electronics Enclosure".



**FIGURE 7-53. Electronics Enclosure**



Using a 2.5 mm hex key, loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the control panel cover, then remove the cover. Now you can access the electrical components in "Electronics Enclosure" on page 7-57.

## 7.14 Control Board



**Caution:** To avoid damaging a harness, make sure you do not pull the harness by the cable wires. Instead, use the connector body to disengage or to engage the connectors.

### Relay Board

Slide the control board out about an inch and disconnect all the electrical connectors along its outside edge, then remove the board.

Dipswitch configuration on replacement control boards. (Refer to [Figure 8-39](#).)

- Switch 1 must be ON.
- Switch 2 must be ON.
- Switch 3 must be ON.
- Switches 4, 5, 6 and 7 are unused and should be OFF.
- Switch 8 must be OFF. (If switch 8 is on, device will power up in Service Mode.)

**Note:** Always perform System Calibration and Humidifier calibration after replacing the control board.

### 7.15 Relay Board



**Caution:** To avoid damaging a harness, make sure you do not pull the harness by the cable wires. Instead, use the connector body to disengage or to engage the connectors.

---

Remove the two M3 hex nuts that secure the relay board retainer bracket with a 5.5 mm socket, then pull the board out a little and disconnect the electrical connectors on the outer edge. Then pull it out a little more and disconnect the connectors at the bottom end of the board. Now the board can be pulled out the rest of the way so the back connectors can be disconnected. You can now access the 2 fuses on the board.

**Note:** Always perform Line Voltage Calibration after replacing the relay board.

### 7.16 Solid State Relays

To replace either of the 2 solid state relays (the relays are identical and carry the same part number), disconnect their electrical connections, and using a 7 mm wrench remove the 2 nuts that secure them to the enclosure.

### 7.17 Power Supply

To replace the Power Supply:

1. Disconnect the following cables:
  - The 50 pin ribbon cable that crosses in front of the Power Supply at either end.
  - The Power Supply AC Input Cable (2093759-001) and Ground (2075836-001) at the Power Supply end only.
  - The Power Supply DC Output Cable (2075837-001) at the Power Supply end only.
2. Using a 5.5 mm nut driver, remove the 4 nuts that secure the Power Supply to the bracket. Installation steps for the replacement Power Supply are the reverse of removal.

After installing the Power Supply perform the following tests:

1. To verify the power supply outputs are correct, measure the following voltages on one of the unused connectors that feed power to the option boards. The voltages are not adjustable. If they are out of specification, the power supply must be replaced.

Signal	Measure at	Acceptable Range
5 Volts	Pins 2 to 1 (Blue/Orange)	4.75 volts to 5.25 volts
12 volts	Pins 3 to 1 (Red/Orange)	10.80 volts to 13.20 volt

### 7.17.1 Toroidal Transformer

To replace the elevating base toroidal transformer:

1. Disconnect the wire harnesses connected to the relay board and remove the board.
2. Using an 1/2" open end wrench loosen transformer retaining bolt.
3. Remove both the toroidal transformer and the retaining bolt. Save the bolt for installing the replacement transformer.
4. Disconnect the old transformer from its wire harness.
5. The replacement toroidal transformer comes with two 4" diameter rubber insulating washers that are installed on both sides of the transformer like a sandwich, and a 4" diameter metal mounting washer that is installed on the same side of the transformer as the head of the retaining bolt. To make aligning these parts easier during installation, you may wish to use electrical tape to attach the 3 large washers to the transformer.
6. Install the new transformer by passing the retaining bolt through the washers and transformer and into the threaded hole in the side of the electrical enclosure. Turn the transformer so you can see the label on the side transformer to orient the wire harness so it exits toward you, then finish tightening the retaining bolt.
7. Connect the transformer wire harness.
8. Reinstall the relay board and reconnect its wire harnesses.

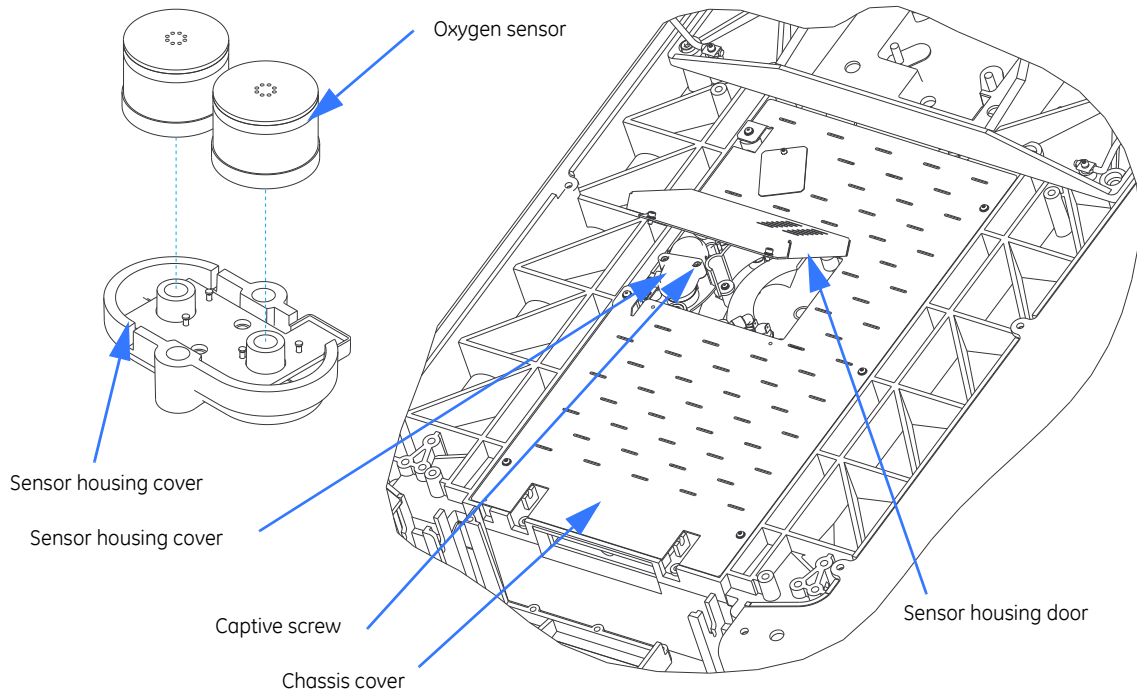
### 7.17.2 Canopy Lift Motor, ISO Transformer, Circuit Breakers, Power Switches, and Power Outlets

The canopy lift motor, ISO transformer, circuit breakers, power switches and power outlets can all be more easily accessed by removing the connection panel at the bottom of the enclosure by removing the 3 screws that secure it with a 2.5 mm hex key.

## 7.18 Servo Controlled Oxygen Service Procedures

### 7.18.1 Installing Oxygen Sensors

Refer to [Figure 7-54](#).



**FIGURE 7-54. Installing Sensors**

1. Slide the drawer to one side and using a 3 mm hex key, loosen the captive screws in the chassis cover sensor housing door and swing the door down to access the sensor housing.
2. Using a 3 mm hex key, loosen the two M4 socket head screws that secure the sensor housing cover, and remove the cover.
3. Remove the old oxygen sensors. Replace with two new sensors (2084419-001).

**Note:** The date on the sensor is a discard date; the sensor should be removed from service on this date. All sensors are shipped from GEHC at least 12 months prior to this date; sensors should be installed immediately to ensure maximum operating life.

4. Reinstall the sensor housing cover and close and secure the door in the chassis cover.
5. Perform the Pre-use Checkout.

### 7.18.2 Replacing the Vent Screen

1. Remove rotating mattress tray, tilt platform and upper pan.
2. Remove the vent cover by turning it counter clockwise.
3. Remove and discard the ring shaped vent filter screen from the chassis vent.
4. Install a new vent screen and reinstall the vent cover.
5. Perform the Pre-use Checkout.

### 7.18.3 Sensor Housing Repairs

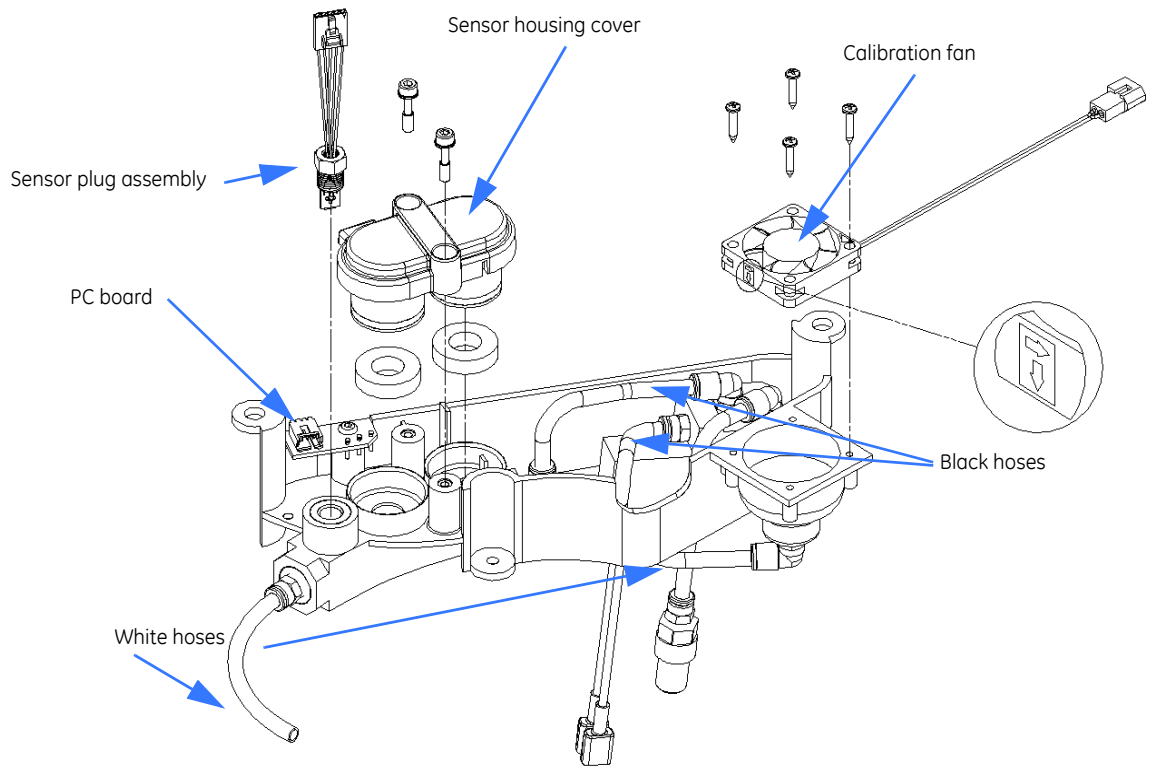


FIGURE 7-55. Sensor Housing

#### 7.18.3.1 Sensor Housing Repairs: Boards, Calibration Fan Assembly, and Sensor Plug Assembly

1. Slide the drawer to one side and using a 3 mm hex key, loosen the captive screws in the chassis cover sensor housing door and swing the door down to access the sensor housing.
2. Using a 3 mm hex key, loosen the two M4 socket head screws that secure the sensor housing cover, and remove the cover.
3. To replace the half of the PC board inside the sensor housing cover, use 2.5 mm hex key to remove the 2 M4 button head screws that secure it to the cover.
4. To replace the half of the PC board inside the sensor housing, disconnect from the wire harness and remove the single M4 button head screw that holds it to the housing. Perform the Pre-use Checkout.
5. To replace the calibration fan, disconnect its electrical connector and remove the 4 self tapping screws that secure it to the sensor housing. Install replacement fan so **flow arrow on side points up into chassis**. Perform the Pre-use Checkout.

**IMPORTANT:** Fan orientation is critical to proper operation.



6. To replace sensor housing plug assembly, disconnect it from the sensor cable, and use a 7/16" open wrench to unscrew it from the housing, then disconnect its other electrical connector. In addition to taking static sensitive precautions, take care not to touch the sensor portion of the assembly with your fingers to avoid contaminating it. After you replace the plug assembly, perform the Pre-use Checkout.

### Servo Controlled Oxygen Service Procedures

#### 7.18.3.2 Sensor Housing Repairs: Calibration Valve

1. Slide drawer to one side and remove three M4 screws that secure bottom cover to chassis.
2. Remove the humidifier reservoir by pulling forward from bottom. A sheet metal ground strap is located behind the reservoir. Remove the M3 screw that secures the strap to the bottom cover. Slide drawer to other side and remove remaining three M4 screws that secure bottom cover to chassis. Remove the cover by sliding out toward the right side of the device.
3. Disconnect the ground cable from bottom cover. The ground cable is secured to a 4 mm stud in the bottom cover with a nut and two internal tooth lock washers.
4. Disconnect the cooling fan cable.
5. Use a 2.5 mm hex key to remove the M3 screw that secures the center of the sensor housing to the chassis. Refer to "[Figure 7-55 Sensor Housing](#)".
6. Use a 10 mm nut driver to remove the two stand-off fasteners that secure the sensor housing to the chassis.
7. Disconnect tubing from chassis and heat-sink vent fittings.
8. Disconnect all harnesses from sensor housing, and remove sensor housing from device.
9. Remove the two M4 flat head screws that secure the calibration valve to the sensor housing, and remove calibration valve assembly.
10. Install new calibration valve assembly. Connect the black wire to the - terminal and the red to the + terminal.
11. Perform the Pre-use Checkout and Leak Check.

## 7.18.4 Valve Housing Repairs

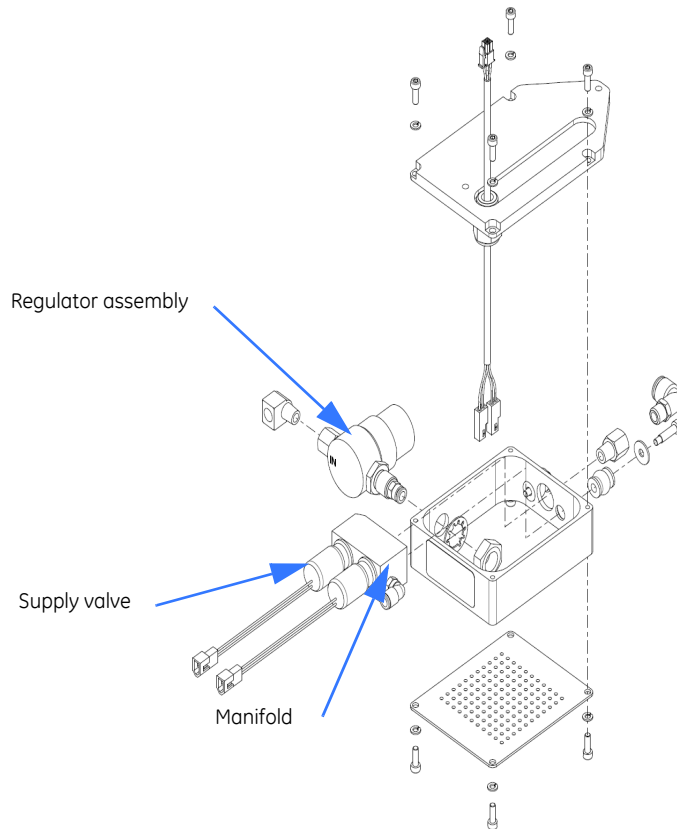


FIGURE 7-56. Valve Housing

### 7.18.4.1 Valve Housing Repairs: Regulator Assembly



1. Using a 3 mm hex key, remove the 4 screws that secure the valve housing bottom cover and remove the cover.
2. Disconnect the tubing from the straight push-in fitting on the regulator assembly.
3. Using two adjustable wrenches, turn the 14 mm hex nut on the inside of the housing while holding the hex on the regulator on the outside of the housing to loosen the assembly. Remove the regulator assembly.
4. To replace the regulator inlet filter, use a wrench to remove the elbow fitting, then turn the filter fitting off the regulator. Before installing a new filter, make sure all old PTFE tape remnants are removed and new tape is applied.
5. When installing the new regulator assembly, be sure to replace the M14 lock washer under the 14 mm hex nut. Hold the regulator so that when it is installed the oxygen supply fitting points straight down at the floor. Perform the Pre-use Checkout.

### 7.18.4.2 Valve Housing Repairs: Supply Valves

1. Remove the regulator assembly as described in steps 1 through 3 above.
2. Disconnect the supply valves electrical connector.

## Servo Controlled Oxygen Service Procedures

3. Use a pair of pliers to turn the valve out of the manifold block.
4. When installing a new valve, finger tighten it into the manifold. Perform the Pre-use Checkout Supply Valve Leak Test.

## 7.18.5 End Cap Safety Valve

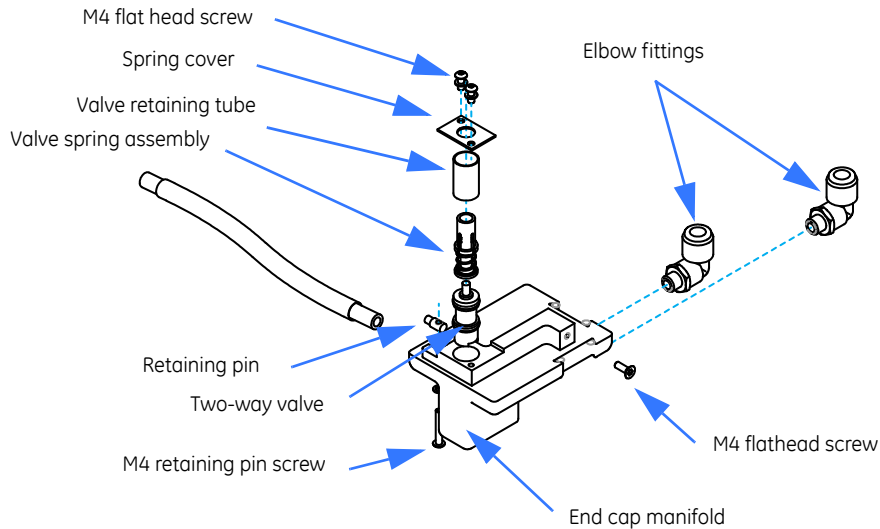


FIGURE 7-57. End Cap Safety Valve



1. To remove the end cap manifold, slide up the dovetail rail trim strip to access the M4 flathead screw (2.4 mm hex key) end cap screw, and remove the screw. Loosen the M4 retaining pin screw and tilt the manifold to disengage the retaining pin from the hole in the dovetail rail and remove the manifold.
2. To replace any of the valve's internal parts, remove the two M4 flat head screws.
3. Use a needle nose pliers to pull the two-way valve from the bore in the manifold. When replacing the valve make sure to lubricate its two O-rings with Vac Kote (6700-0092-200).
4. When reinstalling the manifold, tighten the M4 flathead screw first, then tighten M4 retaining pin screw. Perform the Supply Valve Leak Test and Pre-use Checkout.

## 7.18.6 Servo Oxygen Board Repairs

1. Use a 2.5 mm hex key to loosen the 2 screws in the keyhole slots and remove the 6 remaining screws that secure the electrical enclosure cover, then remove the cover.
2. The Servo O2 Board is located in the second slot of the option card cage. The 485 data cable, sensor housing cable, calibration cable and cooling fan cable are attached to it. The board can be slid part way out of its guide to access its connectors or to replace the U6 EPROM. Perform Pre-use Checkout.



## 7.19 Display Module Repairs

### 7.19.1 Rear Cover



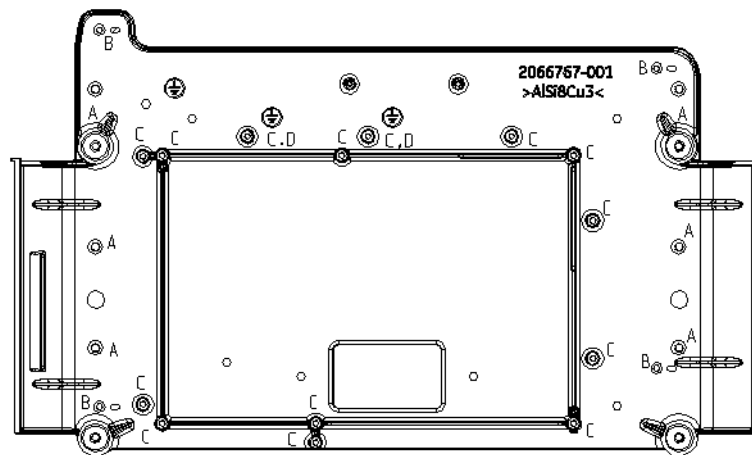
- Using a 3 mm hex key, remove the 4 (M4 X 10) button head socket screws, M4 flat washer, and M4 split washers that secure the back cover to the display module and remove the cover.



FIGURE 7-58. Rear Cover

#### 7.19.1.1 Carrier Plate Hardware

Location	Qty	Part Number	Description	Purpose
A	6	2066776-001	PLASTIC THREAD FORMING SCREW 40 x 12	FRONT BEZEL MTG
B	4	2066775-001	PLASTIC THREAD FORMING SCREW 30 x 10	LCD STAND OFF MTG
C	14	2066774-001	THREAD FORMING SCREW M3 x 8	SBC and ISOLATION SHIELD MTG
D	2	6600-0713-431	STAR WAHSER M3	ISOLATION SHIELD MTG



Display Module Repairs

### 7.19.2 Alarm Lens



1. Remove the display housing rear cover. See "Rear Cover" on page 7-65.
2. Slide the alarm lens toward the back of the device and remove.



FIGURE 7-59. Alarm Lens

**Note:** When reinstalling the Alarm Lens, it may be helpful to loosen two or more of the (40 x 12) thread forming screws that hold the Display Bezel to the Carrier Plate.

### 7.19.3 Alarm Board



1. Remove the display housing rear cover. See "Rear Cover" on page 7-65.
2. Unplug the Alarm PCA Harness from the SBC PCA as shown.

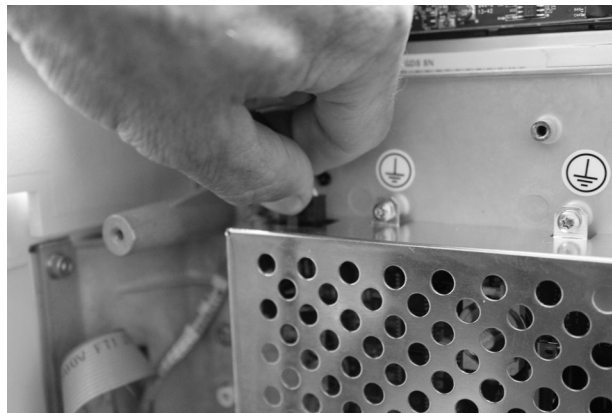


FIGURE 7-60. Alarm Board

3. Using a T10 torx tool, remove the two 30 x 10 thread forming mounting screws upper left and lower right and remove the Alarm Board.

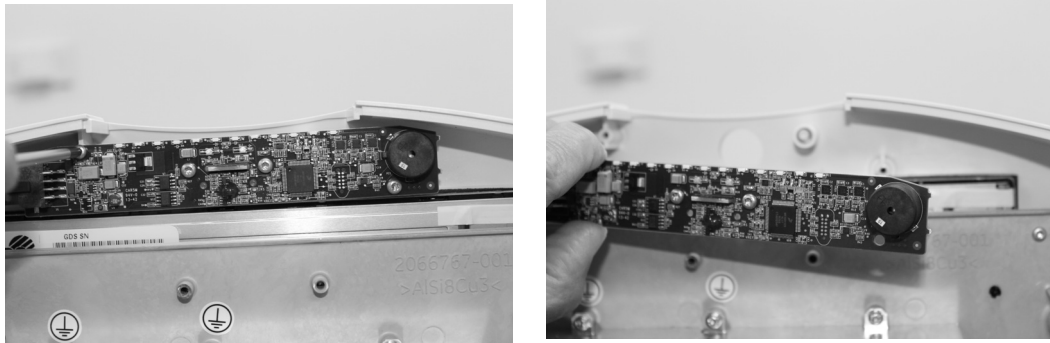


FIGURE 7-61. Alarm Board Screws

**Note:** Do not remove the two middle screws.

4. If you are installing a new Alarm PCA, you will need to complete steps 5 and 6. If not, this procedure is complete.
5. Break the tab off the alarm and save it for assembly of the light pipe.

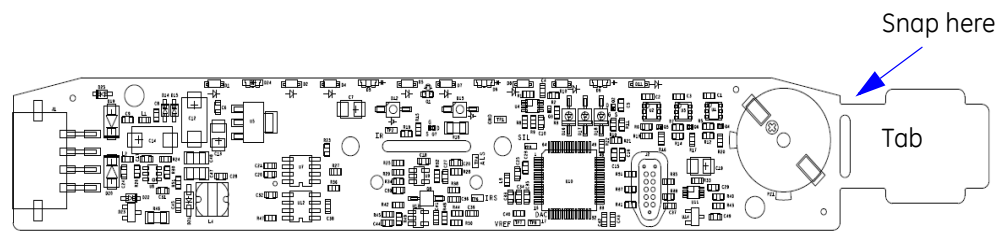


FIGURE 7-62. Tab

6. To assemble the light pipe to the alarm board it is necessary to do one of the following:
  - a. If you are installing a new light pipe 2069160-001 you will need the tab saved earlier. Using a T10 torx tool and two (30 x 10) thread forming screws, assemble the parts as shown.
  - b. If you are reusing the existing light pipe 2069160-001, Remove the light pipe and tab from the old alarm board and install in the same orientation on the new alarm board.

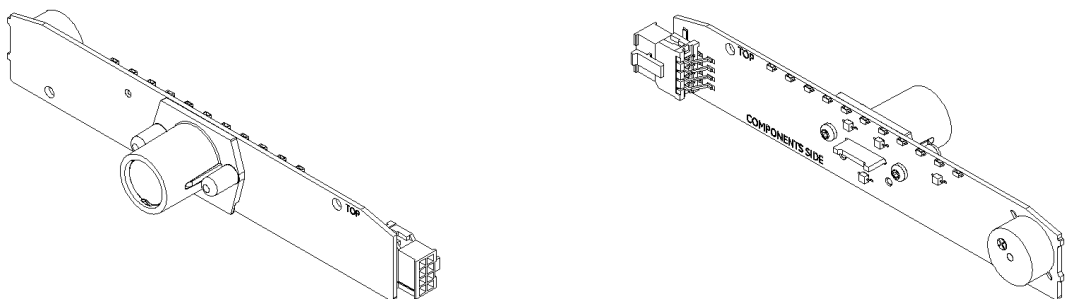


FIGURE 7-63. Light Pipe

### 7.19.4 LCD Display Assembly

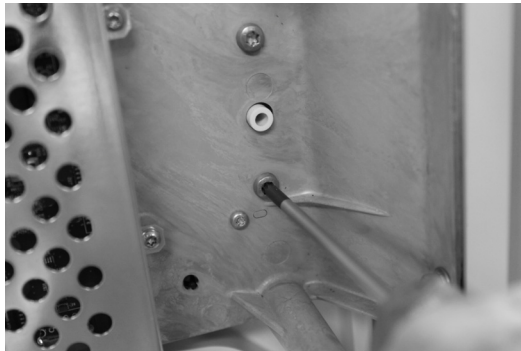


**Caution:** Failure to raise the Canopy before loosening the bezel mounting screws may result in damage to the Display Assembly.

#### 7.19.4.1 LCD Display Disassembly



1. Power on the unit.
2. Using the foot or hand switch, raise the Canopy all the way to the top.
3. Remove the display housing rear cover. See “Rear Cover” on page 7-65.
4. Disconnect the alarm board connector from the SBC board.
5. Working from the back of the device, using a T20 torx tool, remove the six (40 x 12) thread forming screws, three on the left and three on the right that mount the front bezel to the carrier plate and carefully remove the bezel.



**FIGURE 7-64. Remove the Bezel**

**Note:** When completing the following steps, it is possible to hold the display using one hand (Figure 7-65, left image). However, it will be helpful to place the clear plastic mattress support as a Temporary Support (Figure 7-65, right image) over the north and side walls to provide a resting place for the display while working with the harnessing.



**FIGURE 7-65. Temporary Support**

6. Working from the front of the device, using a T10 torx tool, remove the two (30 x 10) thread forming screws that mount the right hand side of the LCD display assembly to the display stand offs.



**Caution:** Be sure to support the display during disassembly to avoid damaging the display.

---



**FIGURE 7-66. Remove Thread Forming Screws**



**Caution:** The leads on the Display Harnesses are fragile. Care when removing the Display Assembly is warranted.

---

7. Slide the display to the right to remove it from the left hand standoffs. Gently set the display on top of the temporary support (OmniBed) or Incubator hood to reduce the stress on the harnesses while accessing the harness connections to the SBC PCA.



**FIGURE 7-67. Set Down Display**



**Caution:** The leads on the Display Harnesses are fragile. Care when connecting/ disconnecting the connectors is warranted. Do not disconnect the harnesses from the Display as reinstalling them may cause permanent damage to the Display.

**Note:** If you are replacing the display, new factory installed harnesses are included in the Display Assembly.

8. Unlatch and remove each of the three connectors from the SBC PCA as follows:
  - a. Unlatch and remove the larger LVDS harness, (upper left center) using your thumb and index finger.
  - b. Similarly unlatch and remove the two remaining Display Harness Connectors (lower and upper right).

**Note:** the release tabs on these are hidden behind the Insulating Shield (black paper) and may require a tool like forceps or small needle nose plier to unlatch them.

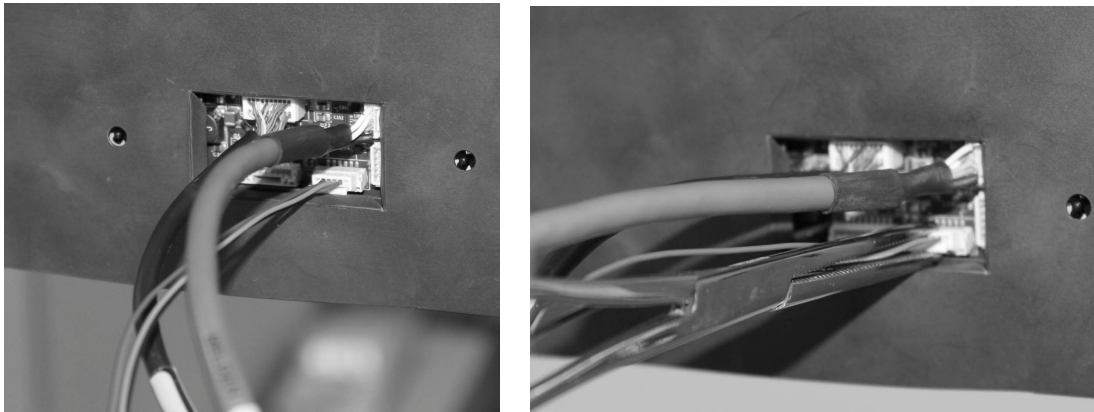


FIGURE 7-68. Harness Connectors

#### 7.19.4.2 LCD Display Assembly

1. Reassemble the Display Assembly following “LCD Display Disassembly” on page 7-68, steps 1 through 8 in reverse order.



**Caution:** Ensure Ferrites are positioned outside the LCD as shown. Failure to do so may result in damage to the display assembly.

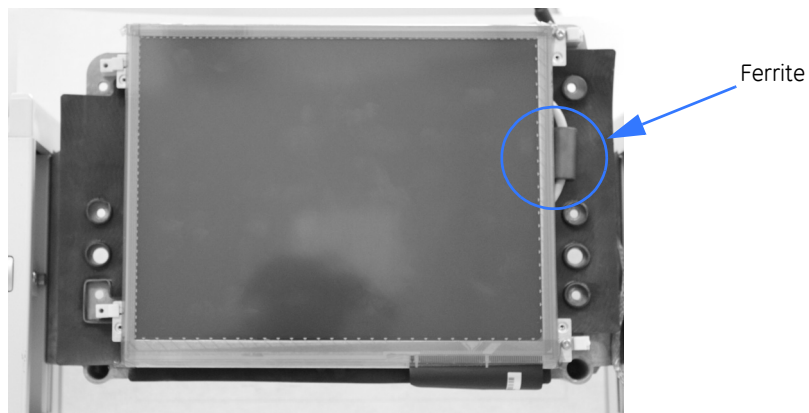


FIGURE 7-69. Ferrite Position

## 7.19.5 SBC (Single Board Computer) PCA

### 7.19.5.1 SBC Disassembly



1. Remove the LCD display by following the steps in "LCD Display Assembly" on page 7-68.
2. Working from the back of the device, disconnect the power harness from the SBC PCA by pulling firmly outward on the white Molex connector. Disconnect the data (ribbon) cable connector by lifting the two locking levers simultaneously. Remove the USB connector IEC plug.

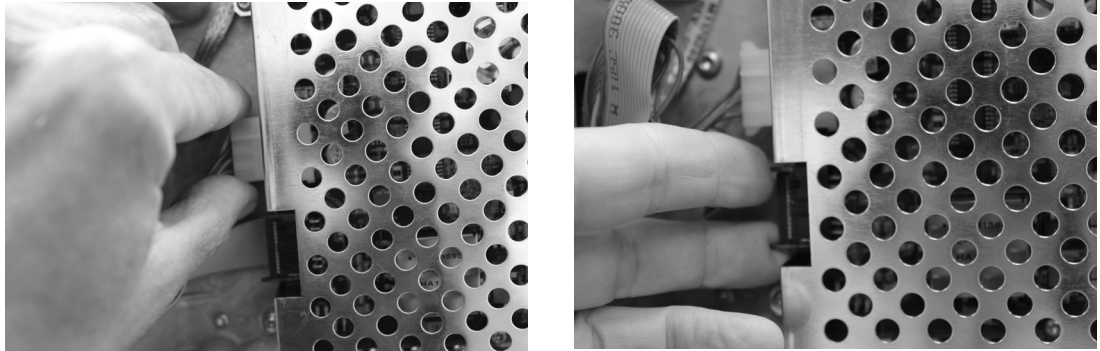


FIGURE 7-70. Disconnect Power Harness

3. Disconnect the Alarm PCA Harness (LINCAN) by firmly pulling up on the connector as shown.

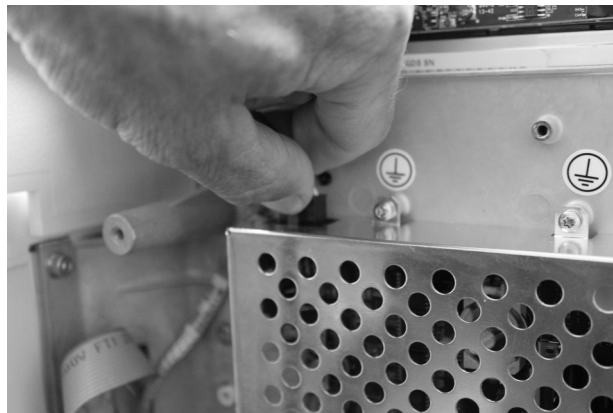


FIGURE 7-71. Disconnect Alarm PCA Harness

**Note:** It may be necessary to use a plier or similar tool to remove connectors. Do not pull on the wires.

Display Module Repairs

4. Working from the back of the device using a T10 torx tool, remove the eight (M3 x 8) thread forming screws that mount the EMI shield to the carrier plate and carefully remove the EMI shield.

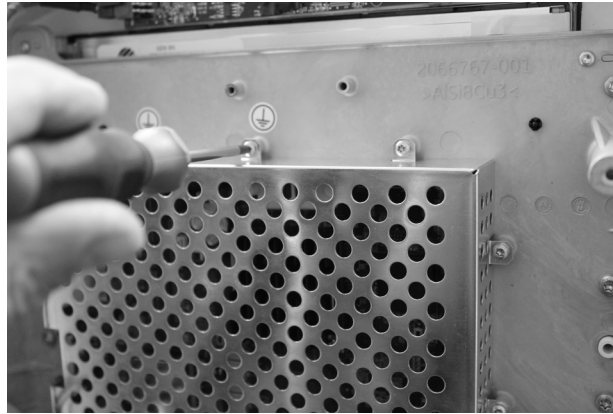


FIGURE 7-72. Remove EMI Shield

5. Working from the back of the device firmly hold the SBC PCA then using a T10 torx tool remove the six (M3 x 8) thread forming screws that mount the Display Driver to the carrier plate.

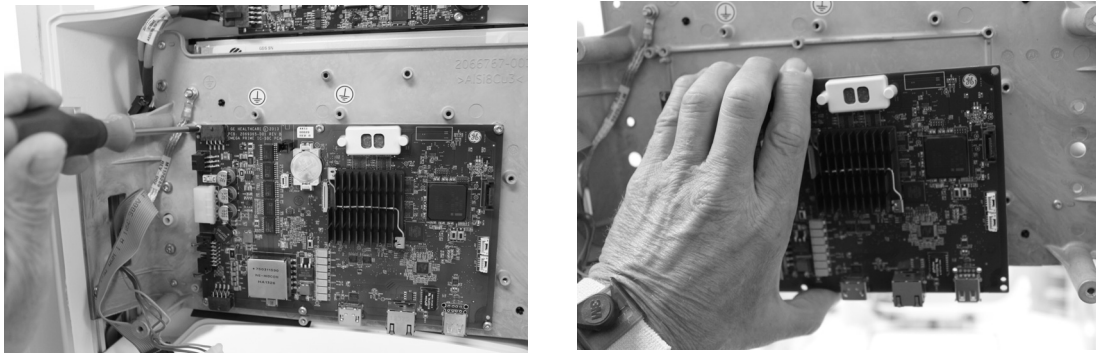


FIGURE 7-73. Remove SBC

6. Remove the SBC PCA.



### 7.19.5.2 SBC Assembly

1. Reassemble the SBC PCA following "SBC Disassembly" on page 7-71 steps 1 through 6 in reverse order.



**Caution:** The Display Assembly requires two types of Torx-drive thread forming screws. When installing the SBC PCA and EMI Shield it is critical that only the THREAD FORMING, M3X8 screw (2066774-001) as shown in Figure 7-75 is used. Please note the difference in the thread of the THREAD FORMING, 30X10 2066775-001 in Figure 7-74. Failure to install the correct screws will cause breakage and result in permanent damage to the metal carrier (mounting) plate.



FIGURE 7-74. Do Not Use Screw

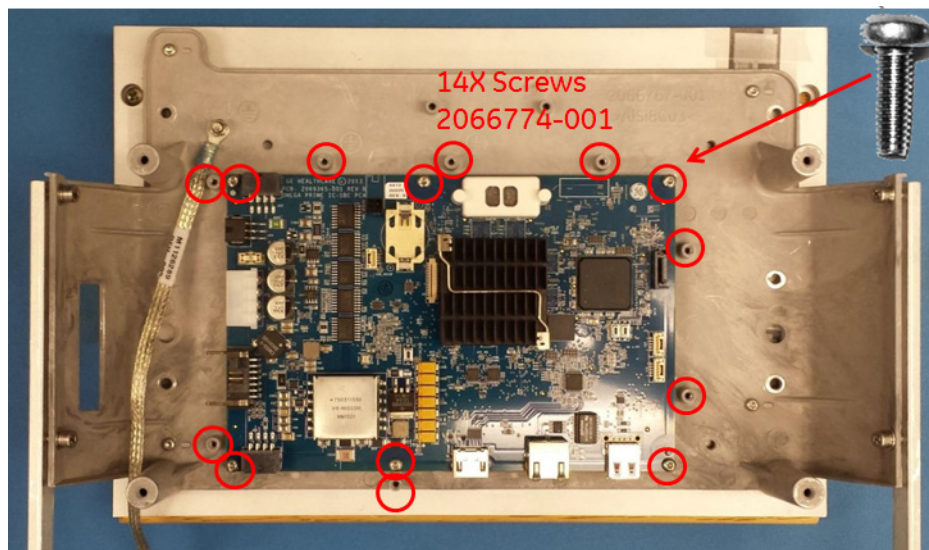


FIGURE 7-75. Screw Location

## 7.20 Clock Battery Replacement

1. Follow the instructions in "Rear Cover" on page 7-65.
2. Follow steps 2 through 4 of "SBC (Single Board Computer) PCA" on page 7-71 to access the back of the SBC board.
 

**Important:** Do not perform steps 1, 5, or 6. It is not necessary to remove the display assembly or the SBC board.

Note the polarity (+ & -) and be sure to install the new lithium ion battery with the same polarity.
3. Use a small screwdriver to slide the old lithium ion battery out of its holder and slide the new battery in its place in the same orientation.



**Caution:** Be sure to wrap the battery in insulating tape before disposing to prevent contact with conductive material and shorting out battery.

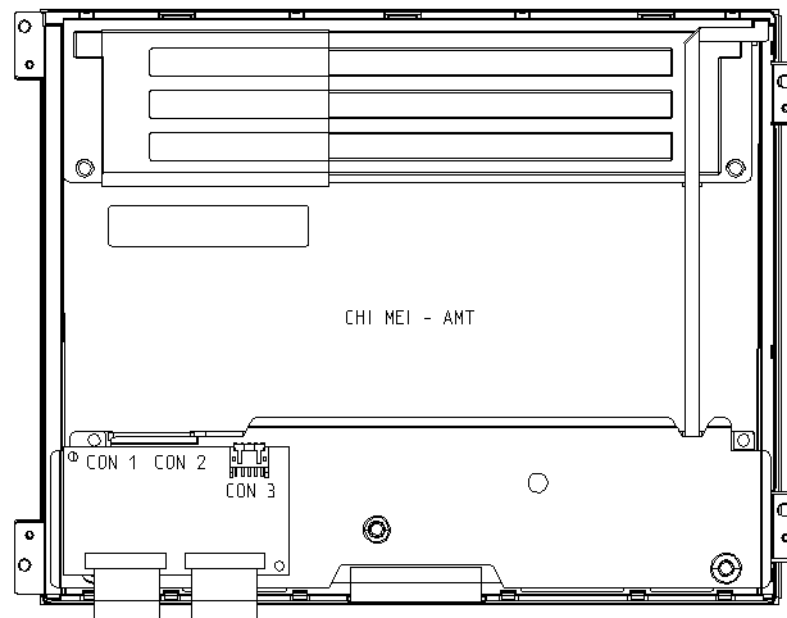


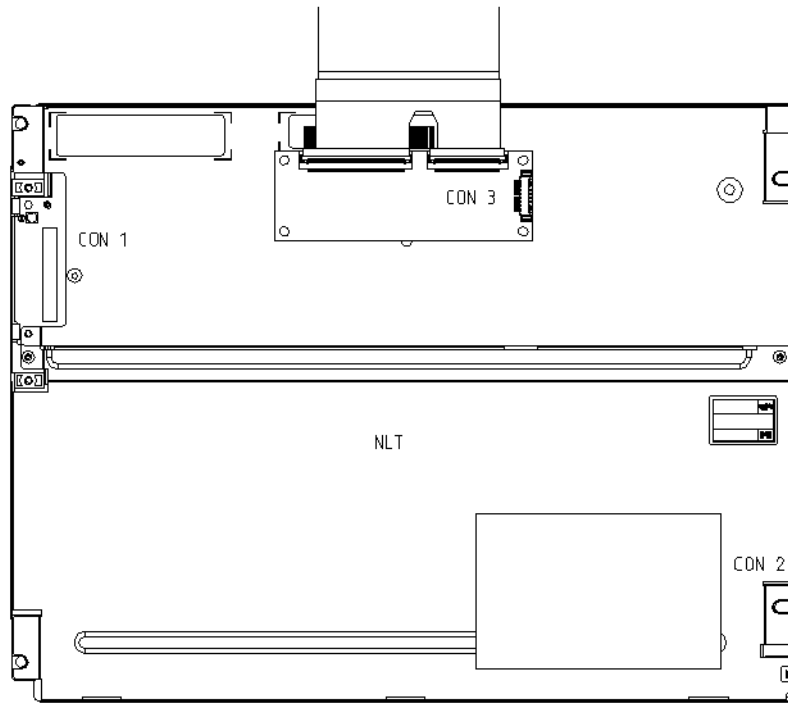
**Caution:** Dispose of the battery in accordance with local toxic waste regulations.

4. Access service mode. (See “Understanding the Service Interface Layout” on page 4-3.)
5. Follow the instructions in section “Set Time” on page 4-5 and reset the system date and time.

## 7.21 Display Harness Connections

OEM DISP/TC	Harness	Part Number	SBC	LVDS
CHI MEI-AMT	LVDS	2069665-001	J6	CON1
	PCAP TOUCH SCREEN	2073936-001	J7	CON3
	LED BACKLIGHT	2069702-001	J9	CON2
NLT	LVDS	2075456-001	J6	CON1
	PCAP TOUCH SCREEN	2075449-001	J7	CON3
	LED BACKLIGHT	2075452-001	J10	CON2







# Chapter 8: Illustrated Parts

## 8.1 Probe Housing

1. Screw, M4 x 8 Socket Head .....	6600-0707-408
2. Washer, M4 Split Ring .....	6600-0713-403
3. Washer, M4 Flat .....	6600-0712-403
4. Retaining Frame .....	6600-1288-500
5. Patient Probe Connector Plate .....	6600-1287-502
Patient Probe Label* .....	6600-2325-102
6. Compartment Air Probe Kit .....	2079646-001
Compartment Air Probe assembly .....	2075908-001
Plate/Label Assembly .....	6600-0608-700
Compartment Air Probe Harness .....	6600-1513-700
Strain Relief nut .....	6600-0884-700
Cable Tie .....	6600-0384-400
7. Scale Wire Harness .....	6600-0728-700
Scale connector plate .....	6600-1287-504
Scale label .....	6600-2325-104
Dust Cover .....	6600-1195-600
8. Blank Connector Plate .....	6600-1287-501
Blank label* .....	6600-2325-101
9. Patient Probe 1 Panel Harness6 .....	6600-0716-701
10. Patient Probe 2 Panel Harness6 .....	6600-0716-702
11. Probe Panel Housing .....	6600-0279-850
12. Rocker Switch Assembly .....	6600-0227-850
Power Switch PF Battery Wire Harness .....	2074885-001
Switch Mounting Plate .....	6600-1844-500
Switch Plate Label* .....	6600-2325-108
13. PF Battery holder with adhesive .....	M1049264
14. PF Battery† .....	2089817-001

†Battery is a 7 cell, 8.4v Nickel Metal Hydride battery.

\*Refer to "Labels" on page 8-65.

Probe Housing

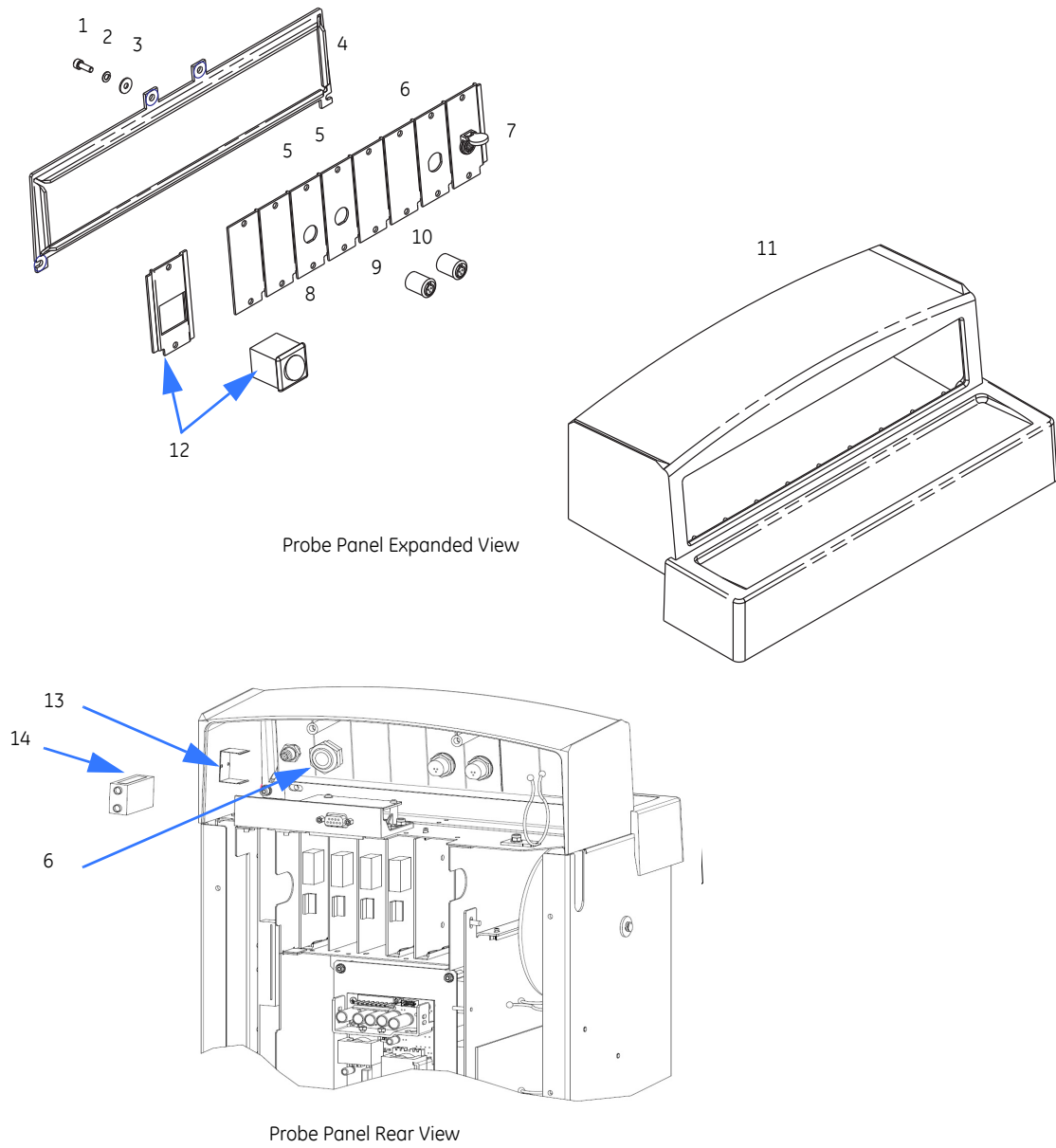


FIGURE 8-1. Probe Panel Assembly

## 8.2 Display Module

Item	Part	Description
1	2074302-001	SVC Kit DISPLAY FRONT ASSEMBLY
2	2066764-001	GASKET FOAM LCD
3	2066766-001	Alarm Lens
4a	2069132-001	LABEL LIGHT PIPE(GE Meatball)
4b	2066760-001	LIGHTPIPE IR
5	2074304-001	SVC Kit ALARM BOARD
6	2074303-001	SVC Kit LCD-TOUCH ASSY
7	2066775-001	SCREW, THREAD FORMING, 30X10 DELTA-PT, OVAL HEAD, S/STEEL, TORX/T10 (alarm board, IR lightpipe, LED standoffs)
8	2073179-001	Plastic Rivet Richco SR3545B
9	2066773-001	STANDOFF LCD
10a	2073130-001	Isolation Shield Large
10b	2095334-001	Isolation Shield Small
11	2066767-001	PLATE, CARRIER, AL
12	2066776-001	SCREW, THREAD FORMING, 40X12 DELTA-PT, OVAL HEAD, S/STEEL, TORX/T20 (Front cover to carrier)
13	6600-1276-500	PART, NUT PLATE MTG DISPLAY GP, Machined
14	2074306-001	SVC Kit SBC BOARD
15	2089821-001	SVC Kit Battery CR2032
16	2067878-001	SHIELD EMI
17a	6600-0713-431	M3 X 3.21D 0.4 STAR WSHR INT
17b	2066774-001	SCREW, THREAD FORMING, M3X8, DIN 7500-C, PAN HEAD, S/STEEL, TORX/T10
18a	2066769-001	Display Cover, Rear
18b	2075101-001	Label Port
19a	6600-0707-409	M4x0.7x10 SOCKET HEAD CAP SCREW (nut bar + rear cover)
19b	6600-0713-403	Washer, Lock M4
19c	6600-0712-403	Washer, Flat M4
20	6600-0711-407	Nut M4 X 0.7 Hex Nut SST
21	6600-0713-432	M4 X 4.31D 0.5 STAR WSHR INT
22	M1126289	Harness, Ground Wire Rail
Items 23 through 31 are not shown. See "Display Harness Connections" on page 7-74 for proper part number identification, cable routing, and connection information.		
23	2069665-001	Harness, Display LVDS (C/A)
24	2069666-001	Harness, LINCAN
25	2069702-001	Harness, LED Backlight CV (C/A)

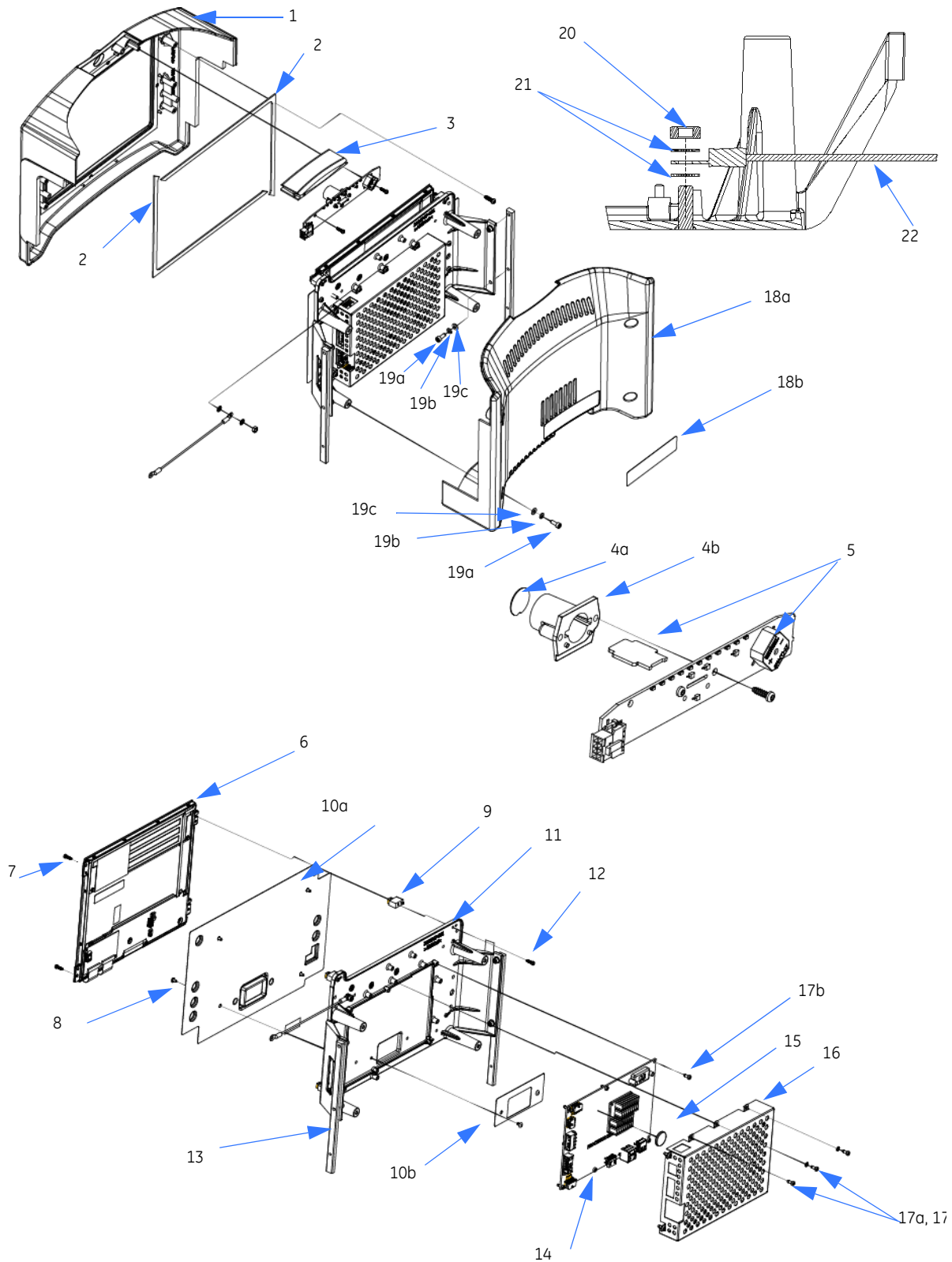


FIGURE 8-2. Display Module Disassembly



### 8.3 Electrical Enclosure

1. Filter harness.....	2086378-001
2. Cable twist lock.....	6600-1197-600
3. Card cage.....	6600-1347-500
4. Relay board bracket.....	6600-1166-500
5. Relay board.....	2080429-001
120 V 2 amp fuse.....	6600-0877-600
230 V 1 amp fuse.....	6600-0882-600
3.15 amp fuse.....	2070016-001
6. Repl Kit Elevating base/cnpy trnsfrmr 115/230V.....	2078108-001
Elevating base/canopy transformer100V.....	2078109-001
7. Screw, 5/16-18 x 2 ½.....	6600-1111-400
8. Solid state relay.....	6600-1003-600
8a. Incubator Solid State relay	
8b. heater Solid state relay	
9. Screw, M6 x 16.....	6600-0707-421
10. Star washer, M6 internal tooth.....	6600-0713-434
11. Flat washer, M6.....	6600-0712-405
12. Star washer, M6 external tooth.....	6600-0713-445
13. Wire shield.....	6600-1798-500
14. Radiant heater transformer 115/230V.....	2078042-001
Radiant heater transformer100V.....	2078103-001
15. Power switch (115V).....	6600-1014-602
Power switch (230V).....	6600-1014-601
16. Line filter.....	6600-1006-600
17. Single plug guard	
U.S., U.K., Italian, Swiss, Australian (short).....	6600-1701-500
C.E. cord (long).....	6600-1857-500
Bumper kit for power cord (40 bumpers).....	M1135907
18. Accessories plug guard.....	6600-1711-500
Brazilian plug guard.....	M1223636
19. Flat washer, M4.....	6600-0712-403
20. Lock washer, M4 internal tooth.....	6600-0713-432
21. Screw, M4 x 8.....	6600-0706-408
22. Washer, color code.....	6600-0338-400
23. Plug ground.....	6600-0337-400
24. Power outlet.....	6600-0583-600
25. Connection panel.....	2084669-001
26. Circuit breaker.....	6600-0562-603
27. Nut, M6.....	6600-0340-400
28. Lock washer.....	6600-0339-400
29. Electrical enclosure.....	6600-1346-500
30. Card tension rack (bottom).....	6600-1064-400
31. Control board.....	2080962-001
32. Card guide (top).....	6600-1183-400
33. Hex nut, M5.....	6600-0711-408
34. Lock washer, M5.....	6600-0713-433
35. Card guide (rear).....	6600-1105-400

Electrical Enclosure

36. Board retaining bracket.....	6600-1822-500
37. M3 Nut for bracket.....	6600-0711-403
38. Screw, M4 x 6.....	6600-0706-407
39. Lock washer M4.....	6600-0713-403
40. Label Ground Mains.....	0205-4735-300
41. Locknut M4.....	6600-0714-402
42. Nut M4.....	6600-0711-407
43. Lock Washer 5/16".....	6600-0608-400
44. Grommet.....	0211-1472-300
45. Grommet w/Adhesive.....	M1110049
6600-1349-500 and Door Hardware Screw Sems M4 x 10	6600-0908-401 (Not shown)
46. Enclosure Door.....	6600-1349-500
47. Harness Ground Equalization Post.....	6600-0870-700
48. SSR Filter Cap.....	2078678-001
49. Harness Warmer Heater/SSR.....	6600-0882-700
50. Harness Power Supply AC Input.....	2093759-001 (Not shown)
Harness Power Supply AC Input Ground.....	2075836-001 (Not shown)
51. Harness AC Mains connection.....	6600-0731-700
(Not shown; connects to the Filter harness, Power Switch, Line Filter, and Power Outlets)	
52. Harness INC Heater,.....	6600-0709-700
53. Screw M4 x 6 Skthd.....	6600-0707-407
54. M3 SPLK washer.....	6600-0713-402
55. M3 FI Washer.....	6600-0712-402
56. Screw M4 x 10.....	6600-0706-409

Also refer to power cords in section ["8.18 Options PNs"](#).

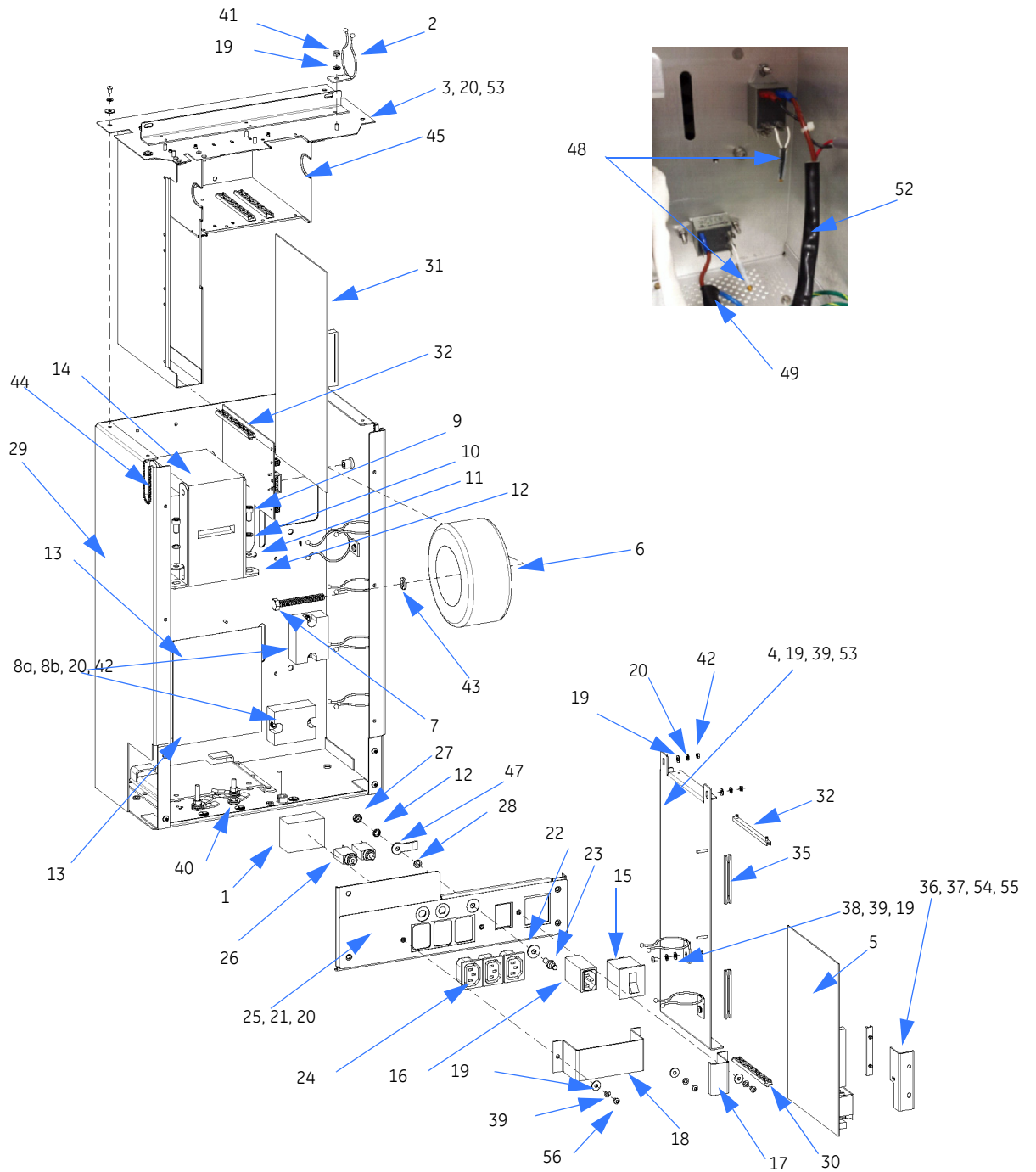
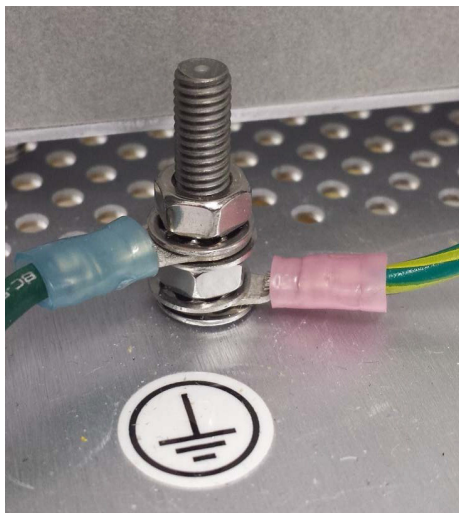
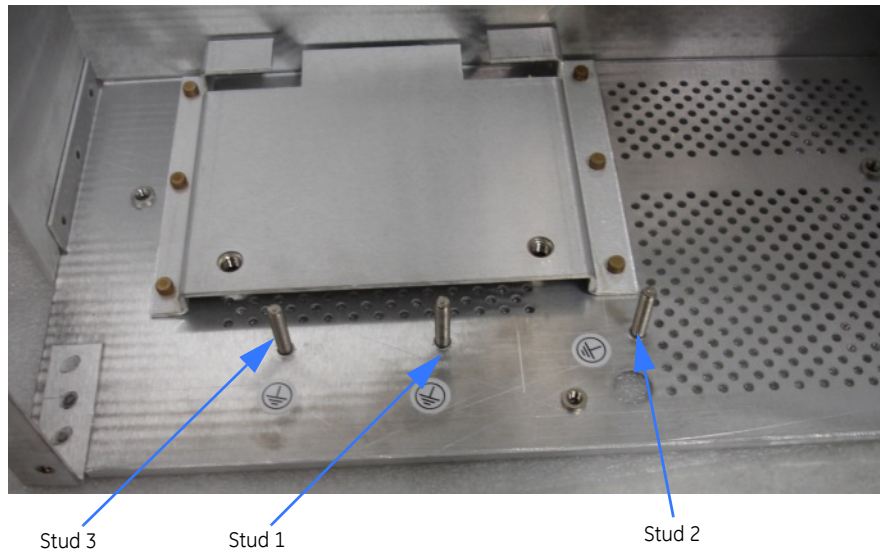
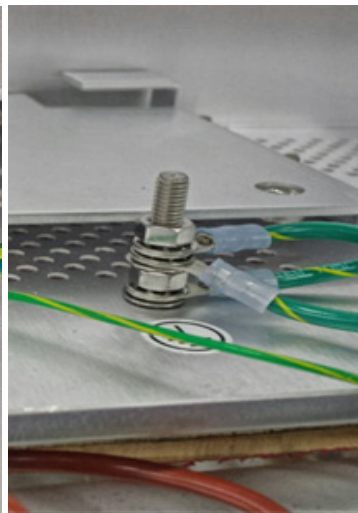


FIGURE 8-3. Electrical Enclosure

### 8.4 Electronic Enclosure Ground Stackup



Stud 3

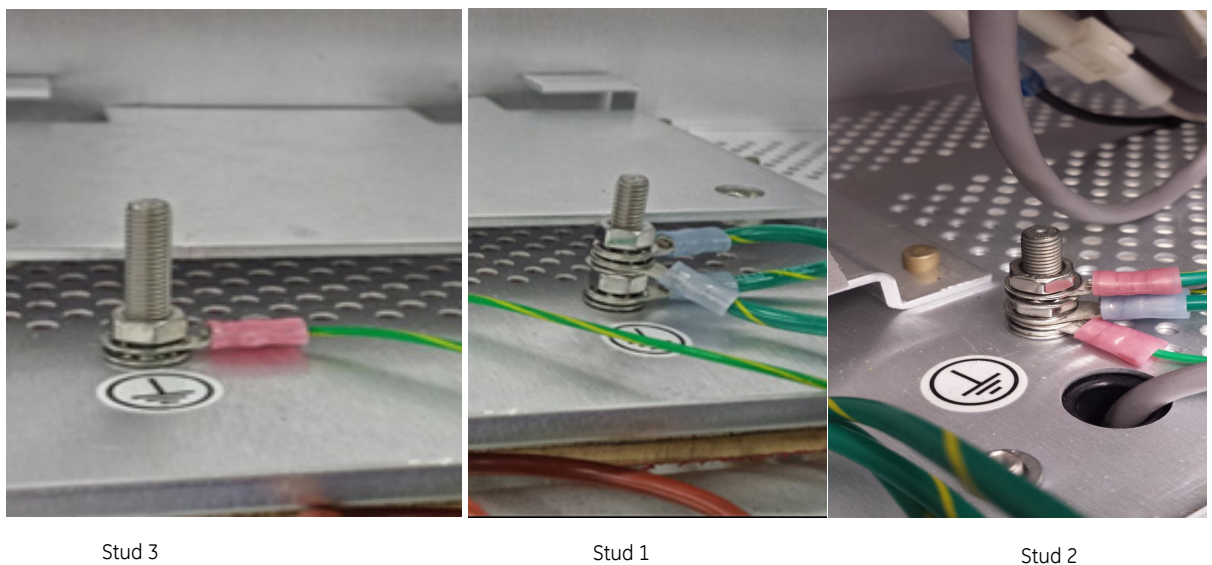
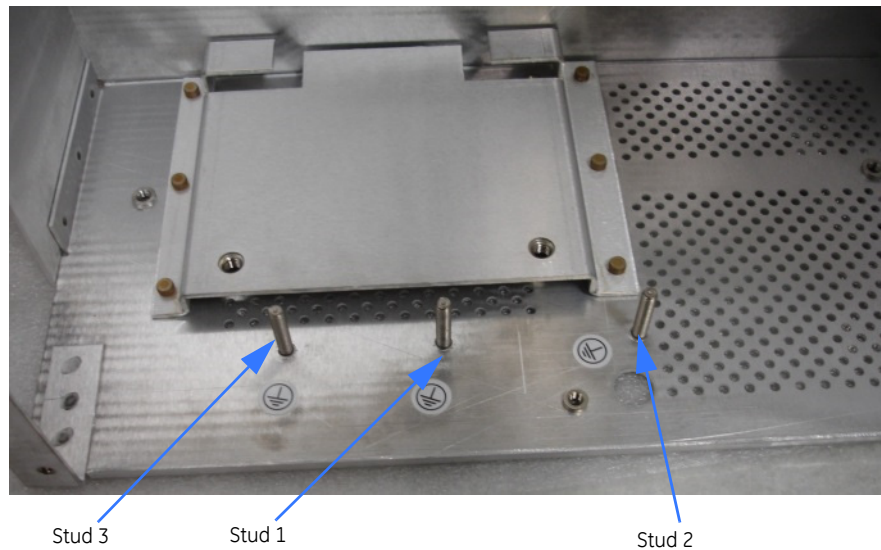


Stud 1



Stud 2

**FIGURE 8-4. Electrical Enclosure Ground Stackup**



**FIGURE 8-5. Electrical Enclosure Ground Stackup (cont'd)**

Stud 3, Hardware Stack up as follows: 33, 34, Ground from Gearbox/Motor, and 34, 33, 34, Ground from Power Supply AC Input, 34.

Stud 1, Hardware Stack up as follows: 33, 34, Ground from Isolation Transformer, 34, 33, 34, Ground from Equalization, 34, Ground from Outlets, 34, 33, 34, Ground wire for line filter, and 34.

Stud 2, Hardware Stack up as follows: 33, 34, Ground from Warmer MTR/SSR, 34, Ground from Transformer Motor, 34, 33, 34, Ground wire, 34, Ground wire, 34, Ground from Humidity Heater, 34.

## Harnesses

## 8.5 Harnesses

## 8.5.1 Relay Board Harness Connections

Name	Part Number	Connector
ISO Transformer Mains	2078042-001 (115V/220V)	J49
	2078103-001 (100V)	
AC Mains Harness	6600-0731-700	J51
WRM/INC HTR Hardness	6600-0623-700	J54
ISO Adapter HTR Harness	6600-0622-700	J50
Heater Door Switches Harness	6600-0710-700	J31
Hand Hood Control Harness	6600-0744-700	J35
Hood Sensor Harness	2074886-001	J36
Hood Motor Harness	6600-1238-600	J46
E-Base Motor Cable	6600-0753-701	J45
E-Base Foot Control Harness	6600-0715-700	J40
Motor Transformer Harness	2078108-001 (115V / 220V)	J44
(4 wire)	2078109-001 (100V)	
INC SSR Harness	6600-0864-700	J39
RAD Warmer SSR Harness	6600-0816-700 (red/black)	J38
Connect Air Flow Sensor Harness	6600-0729-700	J33
Air Motor Harness	6600-0711-700	J30
Harness Power Supply AC Input	2093759-001	J48
Power Switch Harness (2-wire)	2074885-001	J47
Motor Transformer Harness	2078108-011 (115V/220V)	J52
(2-wire)	2078109-001 (100V)	
Power Switch Harness (4-wire)	2074885-001	J43
DC Supply Harness	6600-0708-700	J41
Water Sensor Harness	6600-0730-700	J32
Humidifier Heater Harness	600-0714-700	J53
DC Power Harness	6600-0701-700	J42
RH Isolation Harness	600-1526-700	J55
Relay Data Harness	6600-0704-700	J37

## 8.5.2 Control Board Harness Connections

Name	Part Number	Connector
Environmental Sensor Panel Harness	6600-1513-700	J1
PAT Probe 2 Harness	6600-0716-702	J4
PAT Probe 1 Harness	6600-0716-701	J2
Heat Sink Probe Harness	6600-0742-700	J3
Scale Harness	6600-0728-700	J7
Display Data Harness	6600-0703-700	J8
DC Power Harness*	6600-0701-700	J5
Relay Data Harness*	6600-0704-700	J9

\*These harnesses come from the Relay Board.

## 8.6 Humidifier Transformer and RS-232

1. Power supply\* ..... 2080961-001
2. M3 Kepsnuts ..... M1074118
3. Nylok Nut M4 ..... 6600-0714-402
4. EXT Star washer, M4 ..... 6600-0713-433
5. Washer, M4 ..... 6600-0712-403
6. Humidifier isolation transformer 115/230V ..... 2077510-001  
Humidifier isolation transformer 100V ..... 2077537-001
7. Spacer, M3 x 18 ..... 6600-1192-400
8. Screw, M6 skt. hd. .... 6600-0707-420
9. Lock washer, M6 int. tooth ..... 6600-0713-434
10. Mounting bracket ..... 6600-1587-500
11. Washer, M4 ..... 0402-1133-300
12. Lock washer, M3 ext. tooth ..... 6600-0713-442
13. Nylon lock nut, M3 ..... 6600-0714-401
14. Wire harness, ISO transformer ..... 6600-1526-700
15. Cable twist lock ..... 6600-1197-600
16. RS-232 chassis ..... 2075202-001
17. Harness, RS-232 ..... 2074735-001
18. Svc Kit RS-232 ..... 2081096-001
19. Jack Screw, machine, 4-40X.375,  
Hexagonal Socket, Stainless steel with Nylon Patch ..... 2077118-001
20. Clip RS-232 ..... 2086824-001
21. Isolation Shield RS-232 ..... 2083113-001
22. Screw thread forming 30 x 10 ..... 2066775-001
23. Washer FL M3 ..... 6600-0712-402

\*The fuses on the power supply cannot be replaced. If the fuses are open there will be component damage that necessitates replacing the entire power supply.

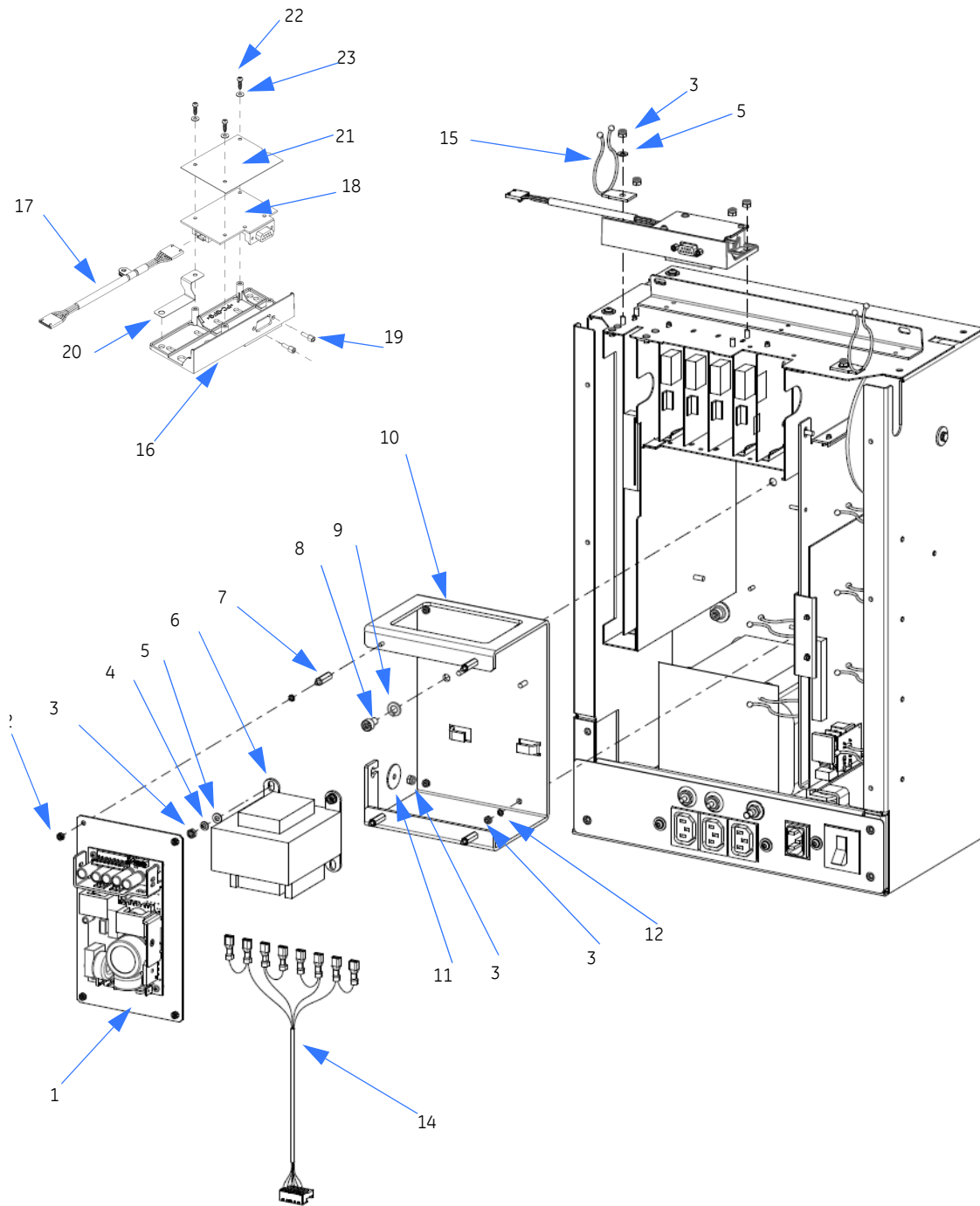


FIGURE 8-6. Humidifier Transformer and RS-232

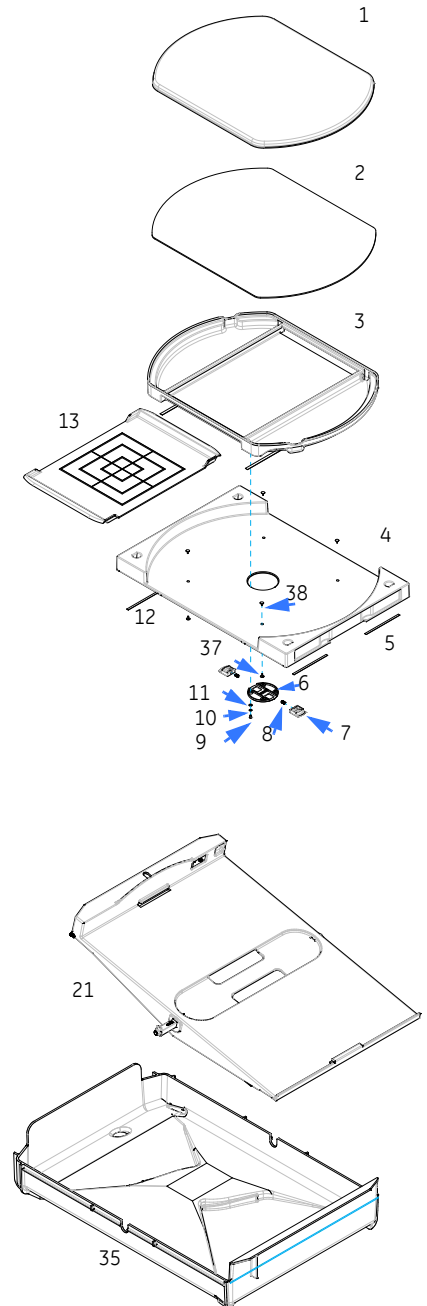


## 8.7 Bed and Side Panels

1. Giraffe pressure-diffusing mattress (blue) .....	2076066-001
2. Clear Plate .....	6600-1365-500
3. Rotating Bed .....	6600-1353-500
4. Translation Deck .....	6600-1352-500
5. Tape (5.4 in.) .....	6600-1758-502
6. Latch Cover .....	6600-1364-500
7. Locking Latch .....	6600-1363-500
8. Spring .....	6600-1079-400
9. Screw M4* .....	6600-0706-409
10. Washer, M4 split ring* .....	6600-0713-403
11. Washer, M4 flat* .....	6600-0712-403
12. Tape (19.3 in.) .....	6600-1758-501
13. X-ray Tray .....	6600-1334-500
14. Tilt Ball and Screw Assembly .....	6600-0814-700
15. Cover .....	6600-1329-500
16. Top Plate .....	6600-1328-500
17. Nut .....	6600-1330-500
18. Plate .....	6600-1457-500
19. Stop .....	6600-1366-500
20. Retaining ring .....	6600-1080-400
21. Tilt platform* .....	6600-1313-500
22. Washer* .....	0202-4520-340
23. Spring* .....	6600-1009-400
24. Brake bracket* .....	6600-1225-500
25. Tilt Brake pad assembly* .....	6600-0853-700
26. Knob* .....	6600-1158-500
27. Cover* .....	6600-1327-500
28. Slide* .....	6600-1227-500
29. Spring* .....	6600-1083-400
30. Ball bearing* .....	6600-1228-500
31. Pin* .....	6600-2023-500
32. Pin retaining clip* .....	6600-0240-400
33. Plunger* .....	6600-1325-500
34. Spring* .....	6600-1043-400
35. Pan .....	6600-0801-700
36. Screw, M4 .....	6600-0706-407
37. Rivet, small .....	6600-1078-400
38. Rivet large .....	6600-1203-400
39. Washer, brake* .....	6600-1335-500

## Parts Not Shown

Tilt Platform assembly (includes all items with\*) ..... 6600-0771-700



Bed and Side Panels

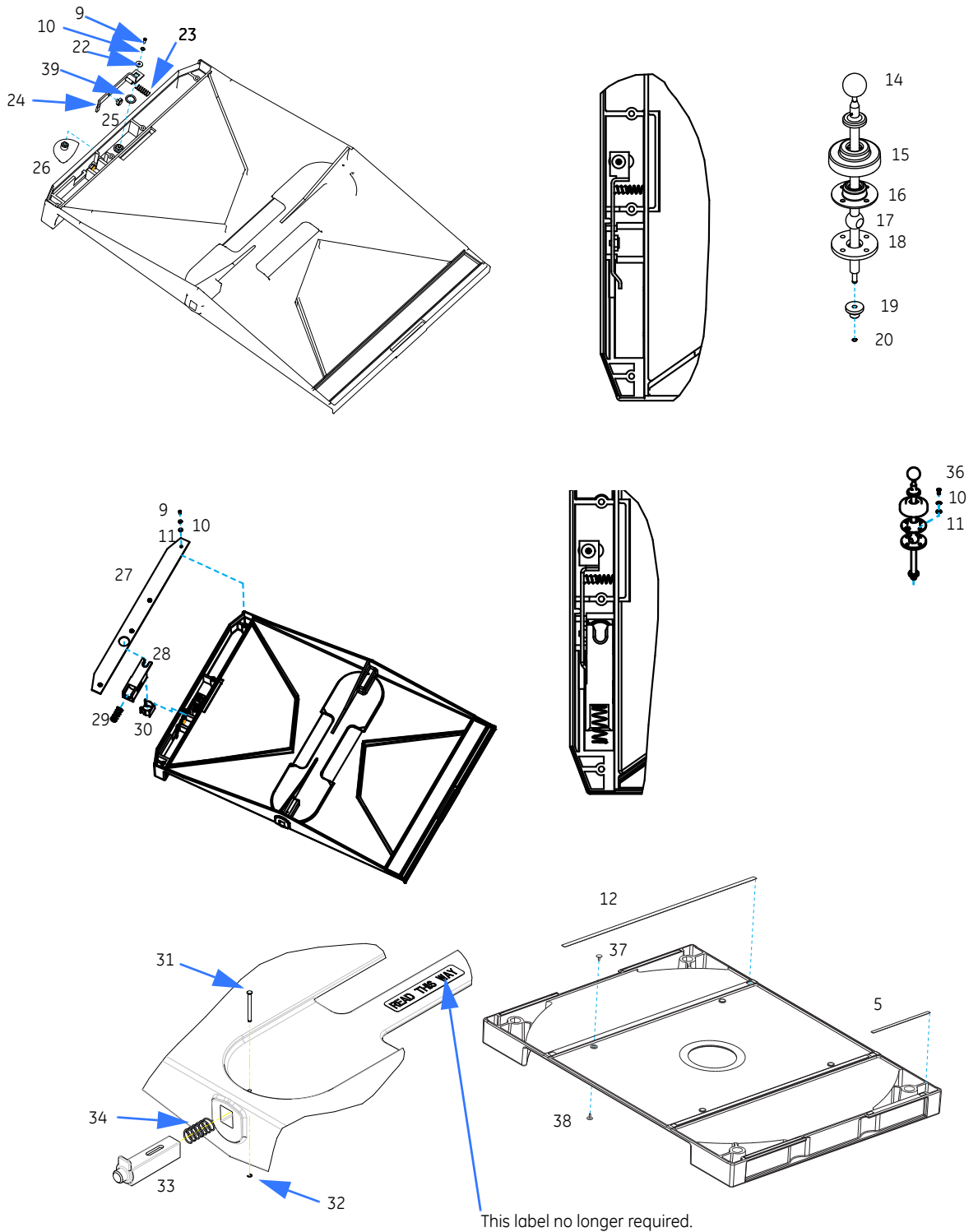


FIGURE 8-7. Bed

1. Giraffe OmniBed side wall (Acrylic) with porthole cutouts.....	6600-1107-500
Giraffe OmniBed side wall (Polycarbonate) with porthole cutouts** .....	6600-1685-500
Giraffe OmniBed East/West Door Kit (Acrylic) (Includes side wall, portholes, hinges, inner wall, door latches) .....	6600-0267-850
Giraffe OmniBed East/West Door Kit (Polycarbonate) (Includes side wall, portholes, hinges, door latches; does not include inner wall)** .....	6600-0134-850
2. Giraffe OmniBed inner wall .....	6600-1201-500
3. Porthole seal .....	6600-1249-500
4. Wall hinge snap .....	6600-1436-500
5. Side wall hinge .....	6600-1149-500
6. Side wall hinge mask label .....	6600-2321-100
7. Giraffe OmniBed side wall inside latch cover .....	6600-1406-500
8. Porthole hinge bottom .....	6600-1239-500
9. Side wall latch .....	6600-1403-500
10. Screw, M2.9 x 9.5 .....	6600-0709-409
11. Side wall latch spring .....	6600-1405-500
12. Side wall latch cover .....	6600-1404-500
13. Wall hinge snap post .....	6600-1429-500
14. Porthole hinge right (East) spring* .....	6600-1026-400
15. Porthole middle hinge .....	6600-1240-500
16. Hinge pin .....	6600-1041-400
17. Porthole hinge left (West) spring* .....	6600-1040-400
18. Flat washer .....	6600-0712-403
19. Split ring lock washer, M4 .....	6600-0713-403
20. Screw, M4 x 16 .....	6600-0706-411
21. Porthole hinge cover .....	6600-1242-500
22. Porthole door .....	6600-1238-500
23. Porthole latch cover* .....	6600-1246-500
24. Porthole latch spring .....	6600-1245-500
25. O-ring .....	6600-1049-400
26. Porthole latch base* .....	6600-1244-500
27. Plastic washer .....	6600-1050-400
28. Screw, M2.9 .....	6600-0709-407
29. Porthole latch spacer .....	6600-1257-500
30. Screw, M4 x 12 .....	6600-0706-410
31. Porthole Latch Assembly (Includes 23-28) .....	6600-0738-700

#### Parts Not Shown

Oscillator (High Freq. Vent) port cover .....	6600-0838-800
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\*\* Polycarbonate side walls are suitable for Giraffe OmniBed units that use high humidity settings for prolonged periods of time. (Acrylic side walls will warp in units that use high humidity settings for prolonged periods of time.)

\* Use Vac Kote (6700-0092-200) sparingly on the porthole door springs (items 14 and 17) and on the surfaces where the door latch pieces (items 23 and 26) slide together.

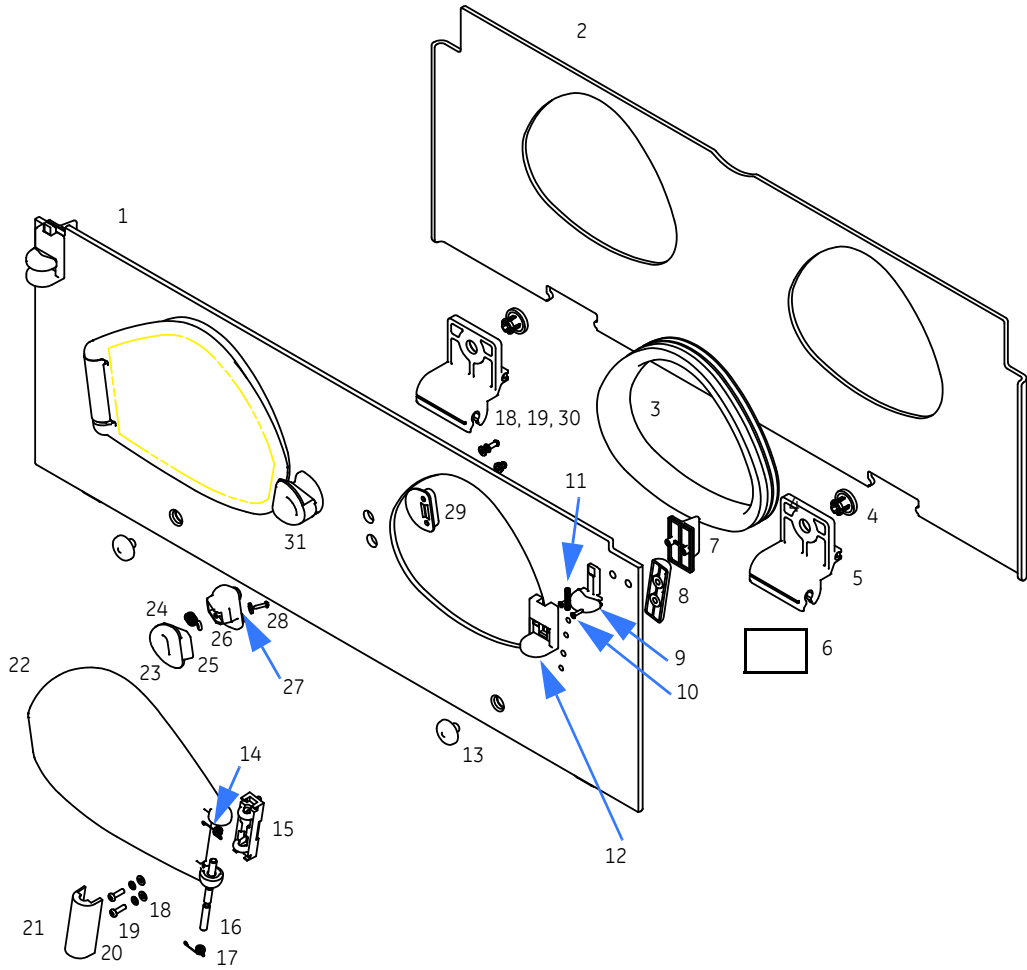
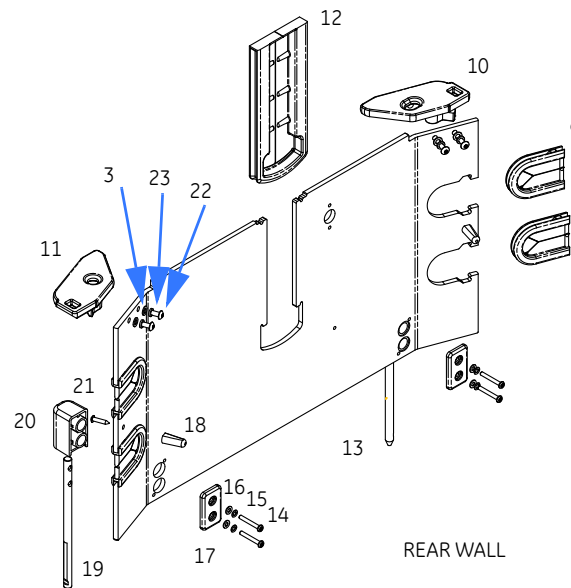


FIGURE 8-8. Side Panel (East/West)



1. Front (south) wall with ventilator cut out.....	6600-0247-854
2. Front (south) wall with porthole cut out.....	6600-0247-851
3. Flat washer .....	6600-0712-404
4. Right front (SE) wall hinge .....	6600-1175-500
5. Wall hinge snap.....	6600-1436-500
6. Left front (SW) wall hinge .....	6600-1304-500
7. Hinge mask label .....	6600-2320-100
8. Wall hinge snap post .....	6600-1429-500
9. Corner grommet.....	6600-1248-500
10. Front left/rear right (SW/NE) receptacle.....	6600-1466-500
11. Front right/rear left (SE/NW) receptacle.....	6600-1467-500
12. Ventilator slot grommet.....	6600-1231-500
13. Rear (north) wall with grommet slot .....	6600-1109-500
14. Screw, M4 x 30 Button Head .....	6600-0706-414
15. Lock washer .....	6600-0713-403
16. Flat washer .....	6600-0712-403
17. Rear (north) wall mount cover .....	6600-1305-500
18. Bumper .....	6600-1485-500
19. Rear (north) wall mount rod.....	6600-1356-500
20. Rear (north) wall mount .....	6600-1428-500
21. Screw, M4.2 x 19 Pan Head .....	6600-0709-404
22. Screw, M5 x 12 Button Head .....	6600-0706-418
23. Lock washer .....	6600-0713-404
24. Front (south) wall solid.....	6600-0247-852
25. Front (south) wall with porthole cut out.....	6600-0247-851
26. Front (south) wall with iris cut out.....	6600-0247-853

## Parts Not Shown:

Oscillator (High Freq. Vent) port cover .....	6600-0838-800
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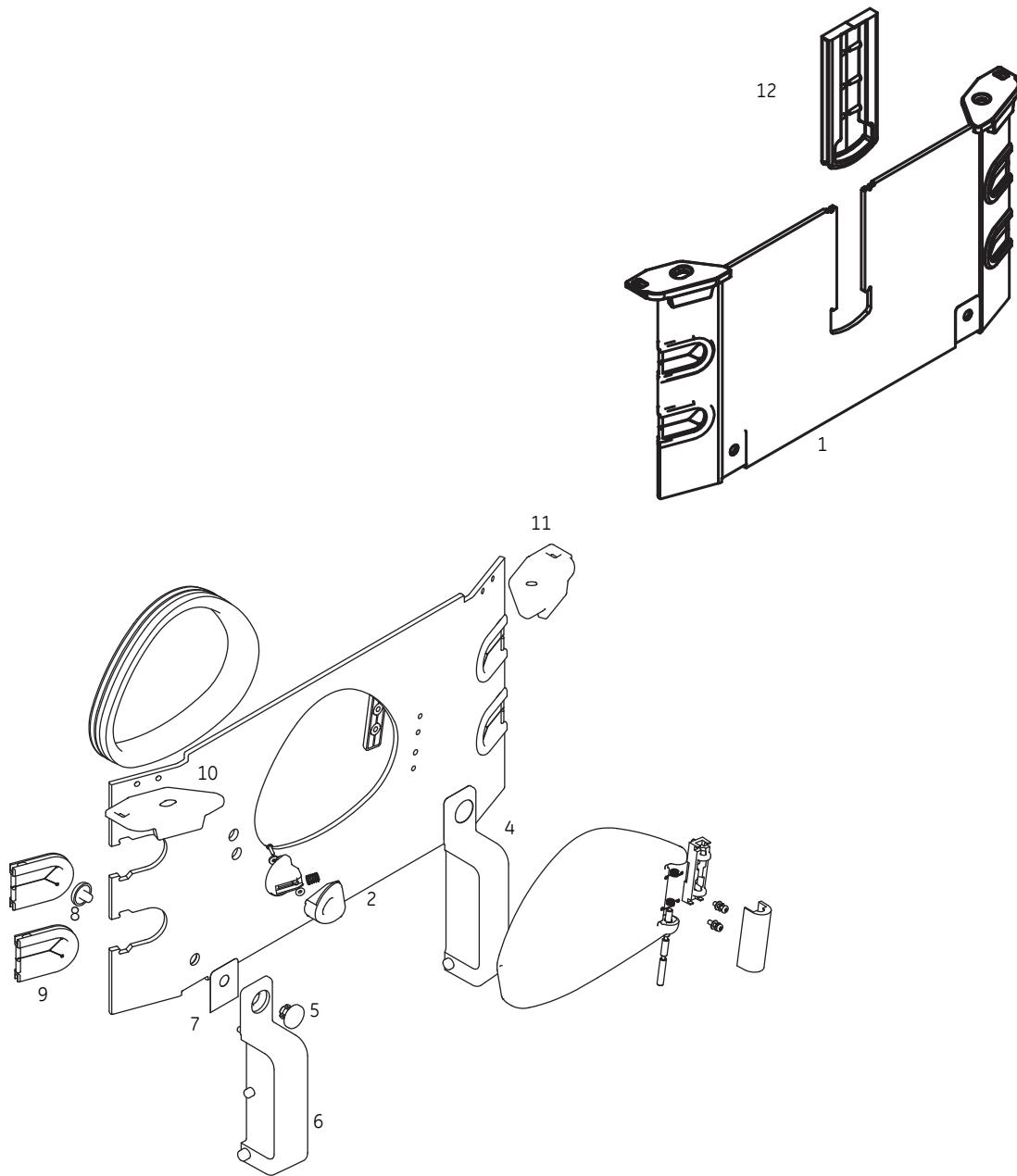
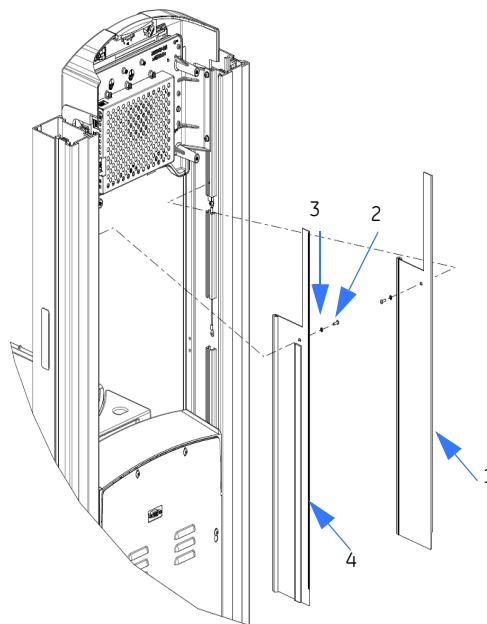


FIGURE 8-9. Rear (North) and Front (South) Wall

## 8.8 Wire Covers



1. Wire cover, left (west) .....	6600-0824-700
2. Screw, M3 x 10 Button Head .....	6600-0706-401
3. Star washer, M3 internal tooth .....	6600-0713-431
4. Wire cover, right (East) .....	6600-0823-700

## 8.9 Radiant Heater and Canopy

1. Top Plate .....	6600-1421-500
2. Radiant Heater Housing .....	6600-1308-500
3. Reflector .....	6600-1281-500
4. Screw, M3 x 6 Socket Head .....	6600-0707-401
5. Radiant Heater Assembly, 480 Watts .....	6600-0220-850
6. Heater Guard Assembly (includes 7) .....	6600-0219-850
7. Warning label .....	6600-2328-101
8. Lock Washer M3 .....	6600-0713-402
9. Nut, M3 .....	6600-0711-403
10. Bushing .....	6600-1120-400
11. Lock Washer .....	6600-0713-403
12. Screw, M4 x 10 Button Head .....	6600-0706-409
13. Flat washer, M-3 .....	6600-0712-402

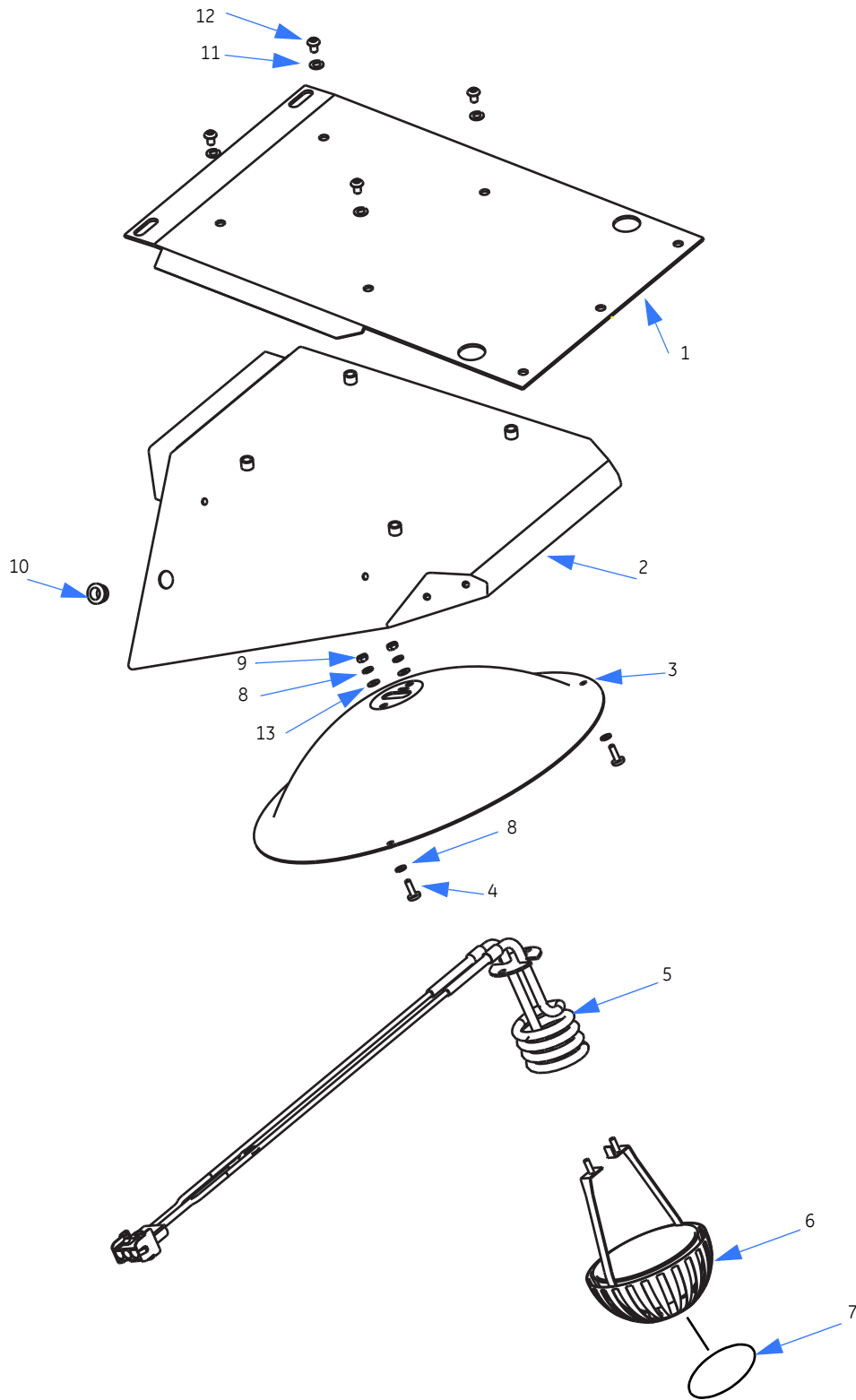
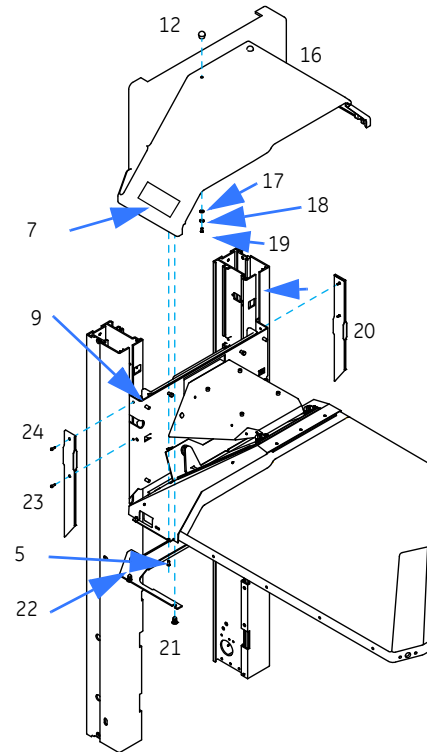


FIGURE 8-10. Radiant Heater



1.	Radiant heater bracket.....	6600-1307-500
2.	Bolt, M6 x 12 .....	6600-0707-481
3.	Nut, M6 x 12.....	6600-0711-460
4.	Heater doors spring spool assembly (includes cable).....	6600-0857-700
	Heater door cable .....	6600-0817-700
5.	Screw, M4 x 10 button head.....	6600-0706-409
6.	Split ring lock washer.....	6600-0713-403
7.	Branding Label .....	2082164-001
8.	Nut, elastic lock, M5 x 0.8 .....	6600-0714-403
9.	Lock nut M3 .....	6600-0714-401
10.	Canopy.....	M1078118
11.	Ground Sticker .....	0205-4737-300
12.	Hood button.....	6600-1788-500
13.	Cable clamp .....	6600-1060-400
14.	Hex nut, M4.....	6600-0711-407
15.	Star washer, M4.....	6600-0713-443
16.	Heater housing cover.....	6600-1220-500
	When ordering item 16, order item 7	
17.	Flat washer, M5.....	6600-0712-404
18.	Split ring lock washer, M5 .....	6600-0713-404
19.	Screw, M5 x 12 Button head socket.....	6600-0706-418
20.	Inside cover, right.....	6600-1459-500
21.	Soffit clip, arrow fastener .....	6600-1056-400
22.	Soffit.....	6600-1461-500
23.	Inside cover, left (west) .....	6600-1477-500
24.	Screw, M3 x 10 socket head .....	6600-0706-401
25.	Back plate bracket.....	6600-1306-500
26.	Shoulder Screw, M4 x 6.....	6600-1201-400
27.	Door .....	2066777-001
28.	Spring.....	6600-1109-400
29.	Screw, M3 x 20 button head.....	6600-0706-404
30.	Split ring washer, M3 .....	6600-0713-402
31.	Spacer.....	6600-1149-400
32.	Tape .....	6600-0110-300
33.	33. M4 Fl Washer .....	6600-0712-403
34.	34. Star Washer M4 .....	6600-0713-443
35.	35. Nut M4 .....	6600-0711-407
36.	36. Hood Rollbar nut .....	6600-1274-500
37.	37. Star Washer M5 .....	6600-0713-433
38.	38. Nut M5 .....	6600-0708-408



7

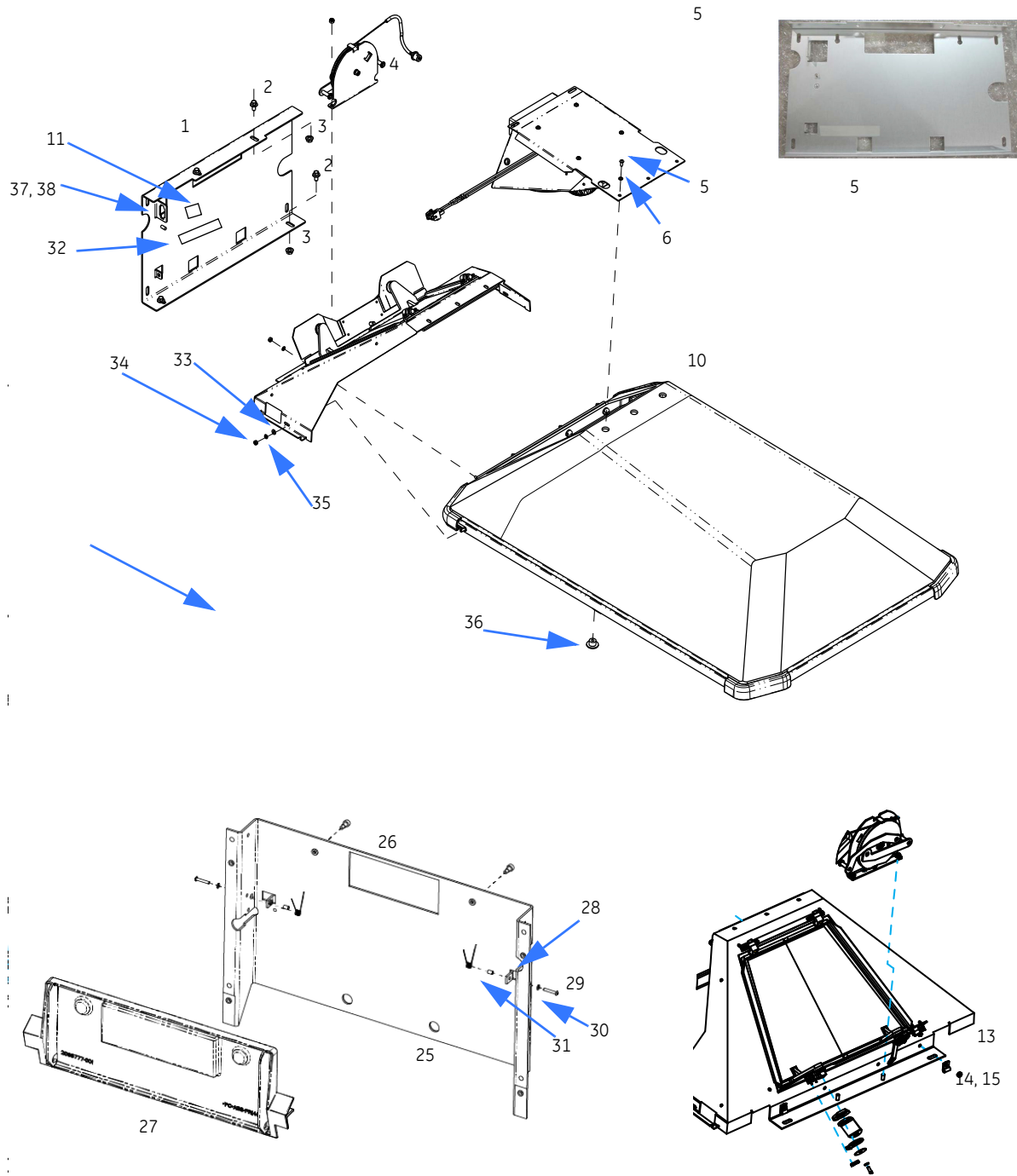


FIGURE 8-11. Canopy

Kits for canopy seals:

**Seal Replacement Kit (contains the following parts)M1208284**

1. West Canopy Seal, quantity 1
2. South Canopy Seal, quantity 1
3. East Canopy Seal, quantity 1
4. North Canopy Seal, quantity 1

**Corner Cover Replacement Kit (contains the following parts)M1208283**

5. Corner Cover SE, quantity 1
6. Corner Cover SW, quantity 1
7. Corner Cover Receiver, quantity 2
8. M4 x 16 Flathead Phillips Screw with Pre-applied Nylon Patch, quantity 2

**Hardware Replacement Kit (contains the following parts)M1208285**

9. M4 x 16 Flathead Phillips Screw with Pre-applied Nylon Patch, quantity 2
10. West Canopy Rail, quantity 1
11. South Canopy Rail, quantity 1
12. East Canopy Rail, quantity 1
13. North Canopy Spacer, quantity 1
14. Rail Spacer, quantity 2 (thicker than spacer washer)
15. Flange Corner NW, quantity 1
16. Flange Corner NE, quantity 1
17. Canopy Corner Pin, quantity 4
18. Canopy Corner Pin Gasket, quantity 4
19. Door Support, quantity 2
20. Door Support Gasket, quantity 2
21. Spacer Washer, quantity 20
22. Smooth Nut, quantity 20
23. M4 x 20 Buttonhead Socket Cap Screw, quantity 2
24. M4 x 16 Buttonhead Socket Cap Screw, quantity 10
25. M4 x 30 Socket Set Screw Cup Point Stainless Steel, quantity 6
26. M4 x 4.1 id 0.9 Thick Splitlock Washer, quantity 14
- M4 Hex Nut Stainless Steel, quantity 6 (not shown)
- M4 x 4.3 id 0.5 Star Washer External, quantity 6 (not shown)
- M4 x 12 Buttonhead Stainless Steel Screw, quantity 2 (not shown)
- M4 x 4.3 id 0.8 Flat Washer, quantity 4 (not shown)

**M1224510 Small Hardware, Canopy Seal Omnibed**

DOOR SUPPORT GH

FLANGE CORNER CAN SE NW GH

FLANGE CORNER CAN SW NE GH

M4 X 4.3ID 0.5 STAR WSHR EXT

M4 X 4.3ID 0.8 FL WSHR ROHS

M4 X 12 BTNHD SCR SST

M4 X 16 BTNHD SCR SST

M4 X 20.0 BTNHD SCR SST

M4X0.7X16 FLHD PH W/NYLO K

M4X4.1ID X 0.9 THK SPLK WSHR

NUT, M4 X 0.7 HEX NUT SST

PART, CANOPY CORNER PIN GASKET, Machined

PART, DOOR SUPPORT GASKET GH, Machined

Radiant Heater and Canopy

- PART, SMOOTH NUT
- PART, PIN CANOPY GH, Injection molded
- SPACER RAIL HUMIDIFIER CP3, Machined
- PART, SPACER WASHER, Machined
- SCREW, M4 X 30 SKT SET CUP PT SST

Retrofit Kit (contains all of the above parts).....M1208286

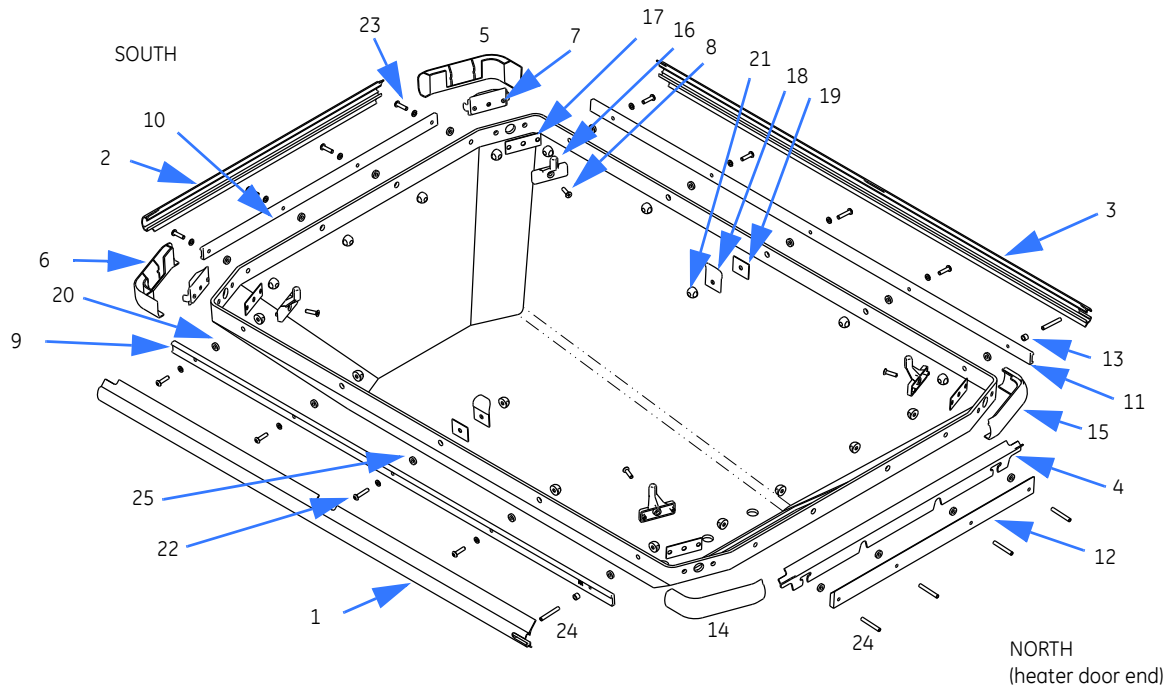


FIGURE 8-12. Enhanced Canopy Seal Parts

1. Foil door, right (East)* .....	6600-1454-500
2. Heater door, right (East)* .....	6600-1309-500
3. Foil door, left (west)* .....	6600-1453-500
4. Heater door, left (west)* .....	6600-1310-500
5. Lower pivot bearing.....	6600-1059-400
6. Elastic lock nut, M3 .....	6600-0714-401
7. Spherical bearing block .....	6600-1058-400
8. Top bearing spacer .....	6600-1702-500
9. Interface bracket .....	6600-1215-500
10. Shoulder screw, socket head.....	6600-1113-400
11. Washer.....	6600-1163-400
12. Top seal.....	6600-1709-500
13. Bottom seal.....	6600-1710-500
14. Gasket .....	6600-1396-500
15. Door switch.....	6600-1154-600
16. Locking nut, 2 -56.....	6600-1165-400
17. Cam spacer.....	6600-0925-400
18. Inner cam (white) with notch.....	6600-1893-500
19. Outer cam (white) with notch.....	6600-1892-500
20. Washer, .175 ID x .875 OD.....	0402-1133-300
21. Split ring washer.....	6600-0713-403
22. Screw, M4 x 10 button head .....	6600-0706-409
23. KEEPER PLATE EAST GH, Sheet metal .....	6600-1644-502
24. KEEPER PLATE WEST GH (NOT SHOWN).....	6600-1644-501
25. Warmer Heater Door Sensor Harness.....	6600-0752-700

\* Always order heater door and foil to install at the same time.

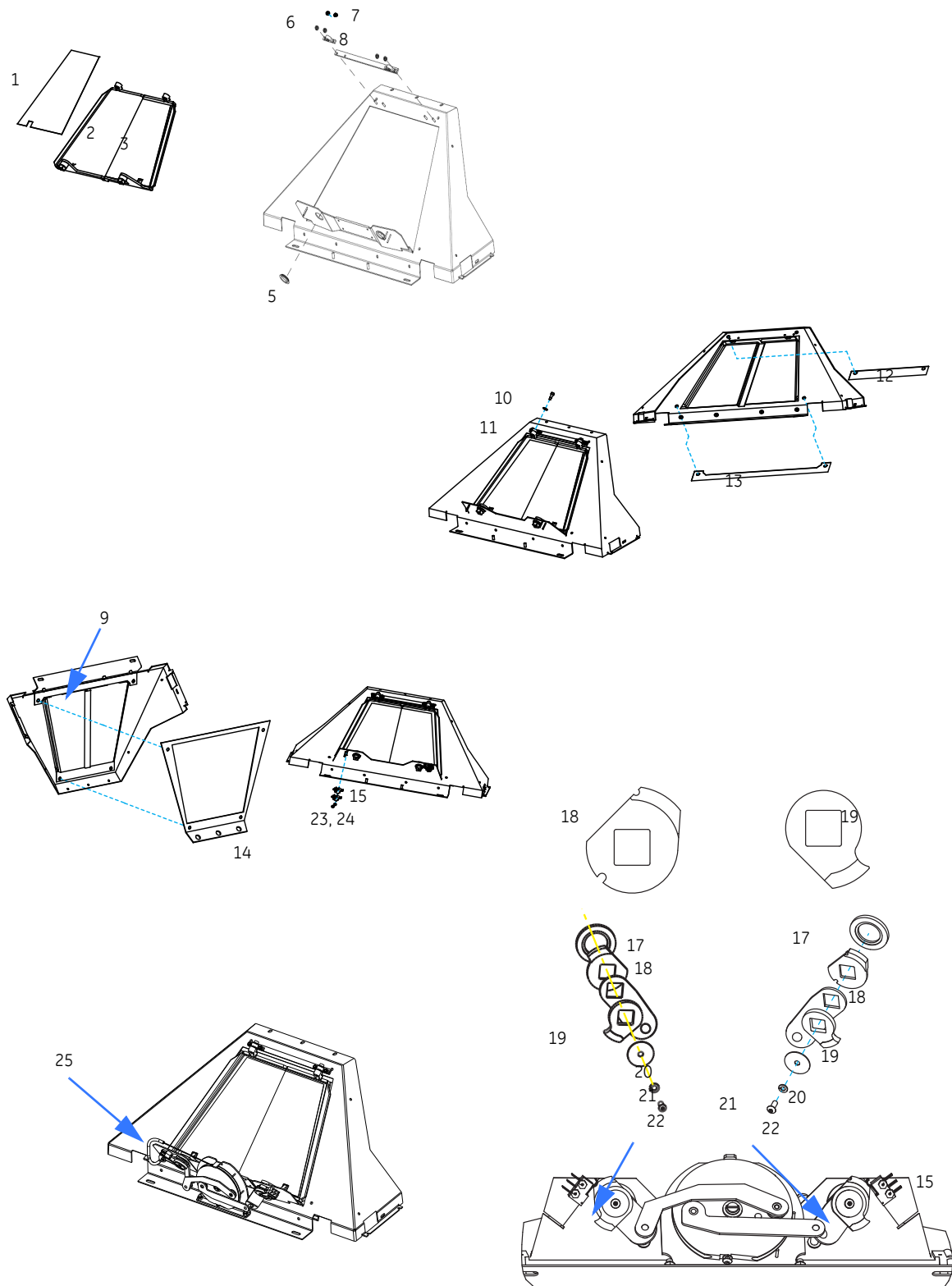


FIGURE 8-13. Heater Doors

## 8.10 Chassis

1. Fan seal .....	6600-1557-500
2. Fan Replacement Kit.....	2097465-001
3. Fan hub .....	6600-1440-500
4. Heat sink.....	6600-1858-500
5. Heat sink gasket.....	6600-0300-300
6. Canopy lift switch, left (east).....	6600-0736-701
7. Canopy lift switch, right (west).....	6600-0736-702
8. Hairpin .....	6600-1046-400
9. Tie down cylinder .....	6600-1795-500
10. Incubator heater and harness assembly .....	6600-1041-700
Retaining clip .....	6600-1211-500

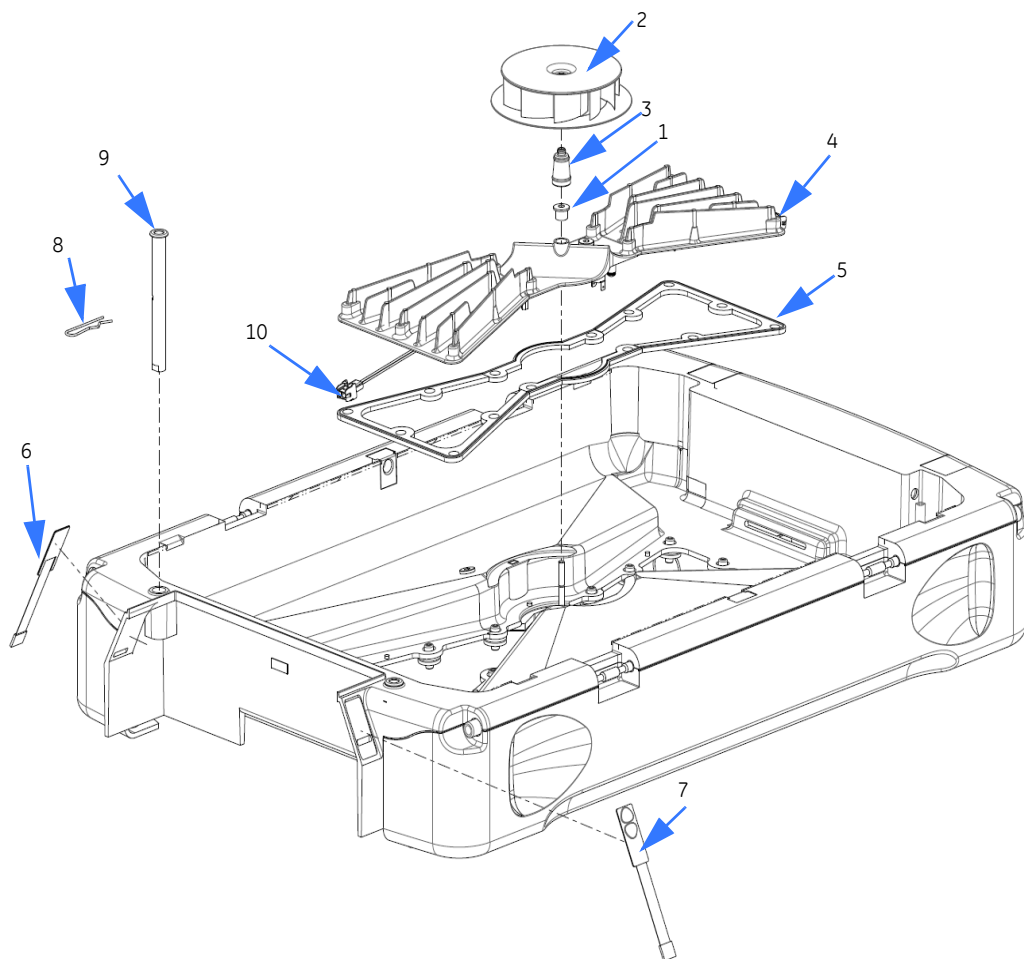
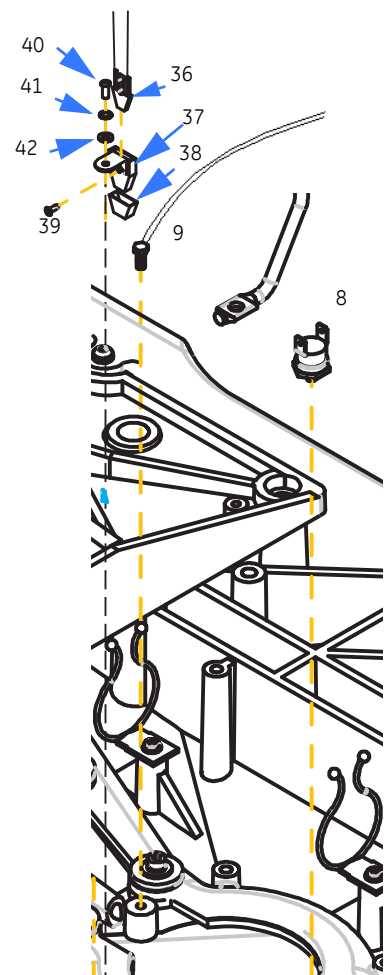


FIGURE 8-14. Upper Chassis

Chassis

1.	Fan motor bracket .....	6600-1162-500
2.	Fan motor.....	2086675-001
	Fan.....	6600-1433-500
3.	Screw, M4 shoulder .....	6600-1051-400
4.	Flat washer, M5 .....	6600-0712-409
5.	Motor mount.....	6600-1000-400
6.	M3 star washer, internal tooth .....	6600-0713-431
7.	Screw, M3 x 6 .....	6600-0707-401
8.	Thermostat .....	6600-1019-600
9.	Heat sink sensor .....	2081533-001
10.	Screw, M5 x 25.....	6600-0707-418
11.	Split ring lock washer, M5.....	6600-0713-404
12.	Bushing.....	6600-1434-500
13.	Silicon washer .....	6600-1778-500
14.	Screw, M4 x 8 .....	6600-0707-408
15.	Split ring lock washer, M4.....	6600-0713-403
16.	Flat washer, M4 .....	6600-0712-446
17.	Wire routing clip .....	6600-1197-600
18.	Front Pleur-evac hanger (south).....	6600-1202-500
19.	Screw, M4 x 10.....	6600-0707-409
20.	Star washer, M4 .....	6600-0713-443
21.	Washer Ext Lock M6 .....	6600-0713-445
22.	Knob.....	6600-0894-400
	Push washer.....	6600-0895-400
23.	Filter cover assy. (includes knob and washer)....	6600-1533-700
24.	Filter (10 pcs).....	6600-0207-850
25.	Chassis.....	6600-0278-850
26.	Bed pivot block.....	6600-1326-500
27.	Screw, M4 x 20.....	6600-0707-412
28.	Door hinge button .....	6600-1285-500
29.	E-clip .....	6600-1045-400
30.	Washer .....	6600-1100-400
31.	Pin stop.....	6600-1730-500
32.	Door spring.....	6600-1044-400
33.	Hinge pin.....	6600-1284-500
34.	Chassis side panel .....	6600-1280-500
35.	Screw, M5 x 12.....	6600-0706-418
36.	Optical fan sensor (includes wire harness).....	6600-0820-700
37.	Sensor holder.....	6600-1435-500
38.	Sensor gasket.....	6600-1437-500
39.	Screw, M2.9 x 6.5.....	6600-0709-405
40.	Screw, M3 x 6 .....	6600-0707-401
41.	Split ring lock washer, M3.....	6600-0713-402
42.	Flat washer, M3.....	6600-0712-402
43.	Side Pleur-evac hanger (E/W).....	6600-1703-500
44.	Screw, M6 x 12, Btn. Hd.....	6600-0706-427
45.	Wire raceway cover.....	6600-1303-500
46.	Screw M4 x 10 Button Head.....	6600-0706-409
47.	Chassis cover.....	2071288-001





48. Screw, shoulder.....	6600-1033-400
49. Flat washer, M5.....	6600-0712-404
50. Spring.....	6600-1299-500
51. Spring clip.....	6600-1300-500
52. Humidifier spacer.....	6600-1814-500
53. Humidifier sound damper.....	6600-1494-500
54. Screw, M3 x 6 button head.....	6600-0706-406
55. Screw, captive M4 x 8.....	6600-0868-401
56. Star washer, int. M4.....	6600-0713-432
57. Flinger.....	2082587-001

## Parts Not Shown

Socket plug (for servo-oxygen hole).....	6600-1214-400
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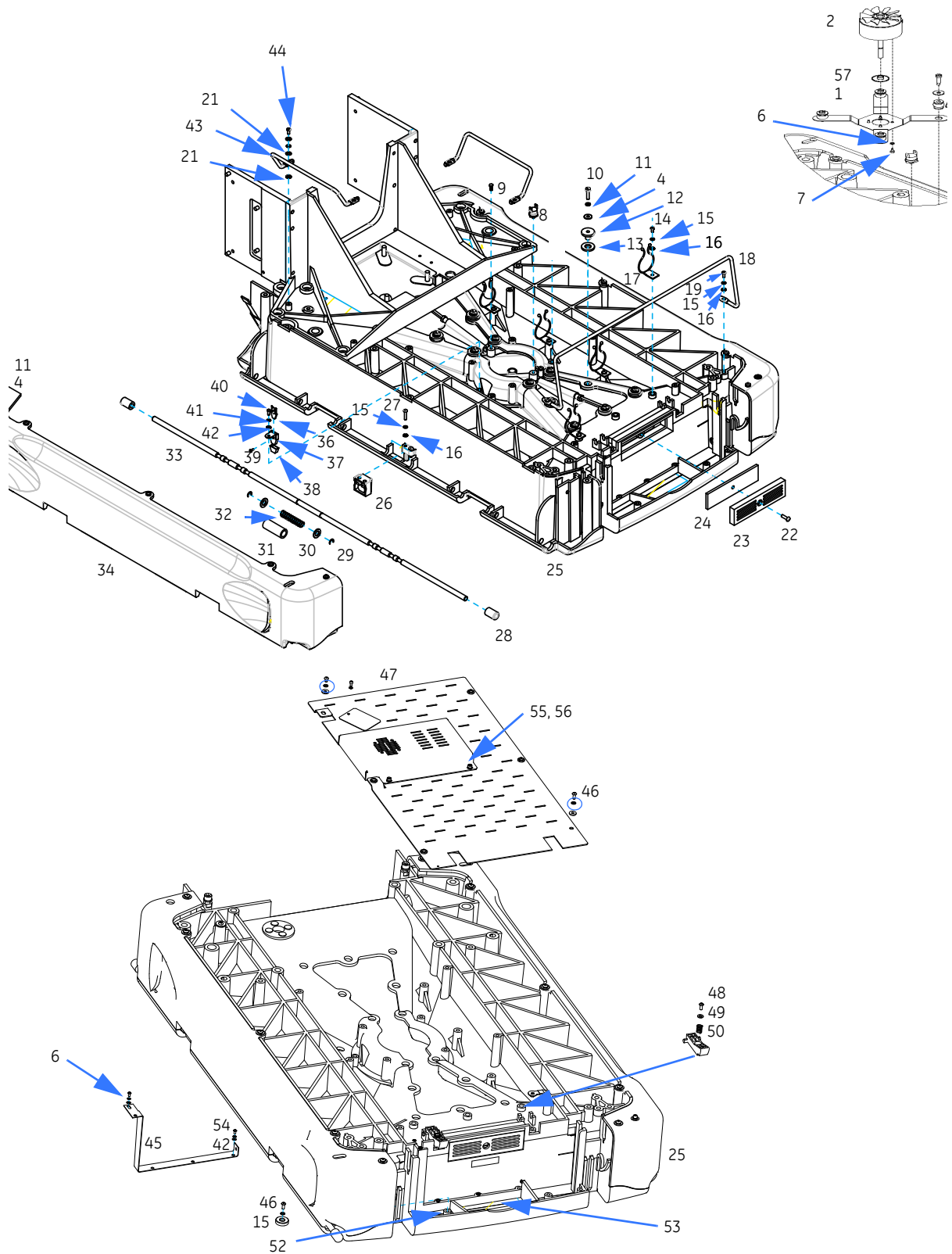


FIGURE 8-15. Lower Chassis

## 8.11 Humidifier

1. Flat washer, M3 x 3.2, ID .5 .....	6600-0712-402
2. Split ring lock washer, M3 x 3.1, ID .8.....	6600-0713-402
3. Screw, M3 x 16 Cheese head Phillips.....	6600-1255-404
4. Reservoir switch (included in item 21)	
5. Button, reservoir switch.....	6600-1298-500
6. Top humidifier gasket.....	6600-1293-500
7. Heater mount.....	6600-1291-500
8. Screw, M3 x 8 Cheese head Phillips, Teflon coated.....	6600-1255-401
9. Ramp block.....	6600-1777-500
10. Humidifier gasket bottom .....	6600-1294-500
11. Protective insert* .....	6600-1714-500
12. Reservoir seal .....	6600-1495-500
13. Insulating cylinder .....	6600-1182-500
14. Bottom bracket.....	6600-1181-500
15. Steam outlet.....	6600-1296-500
16. Silicone tube.....	6600-1780-500
17. Heater sheath .....	6600-1292-500
18. Nut, hex 6 -32.....	0144-3324-113
19. Split ring lock washer, #6 .....	6600-0345-400
20. Safety thermostat assembly .....	2081692-001
21. Add water thermostat assembly (includes item 4) .....	2074884-001
22. Humidifier heater* .....	6600-0224-850
23. Spacer, .125 ID.....	6600-1779-500
24. Humidifier top bracket.....	6600-1295-500
25. Star washer, M3 x 3.2 ID .....	6600-0713-442
26. Screw, M3 x 12 Cheese head Phillips.....	6600-1255-403
27. Humidifier reservoir.....	6600-0216-850
Reservoir bottom .....	6600-1493-500
Reservoir lid.....	6600-1492-500
28. Screw, M3 x 10 skt. hd. ....	6600-0707-403
29. Screw, M3 x 10 Cheese hd. Phillips Teflon coated .....	6600-1255-402
Parts Not Shown	
Humidifier assembly (includes all parts above except reservoir) .....	6600-0245-850

\*Always replace item 11 when replacing item 22.

Humidifier

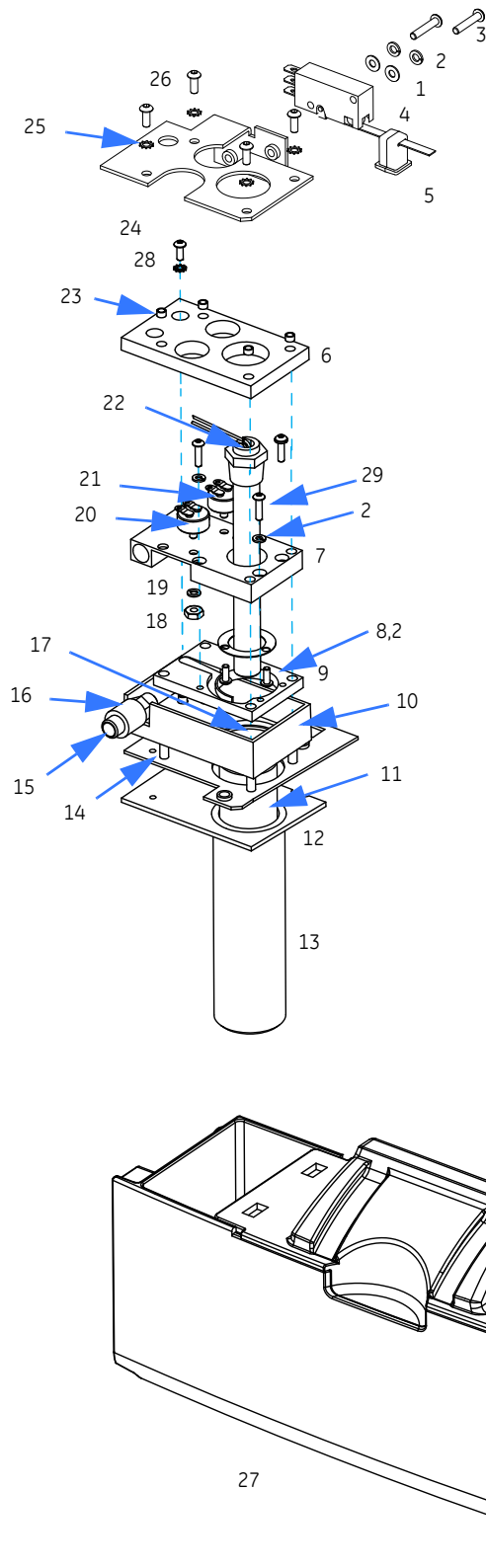
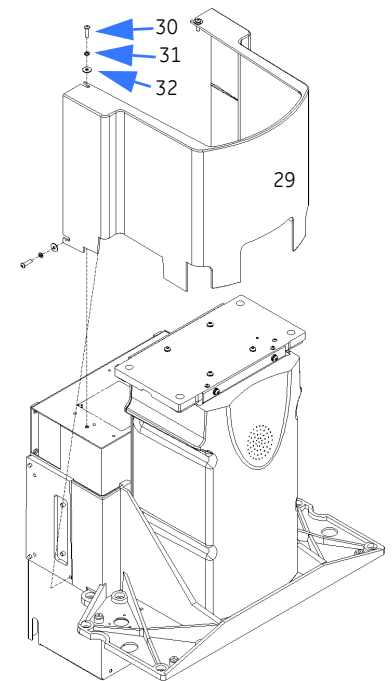


FIGURE 8-16. Humidifier Assembly

## 8.12 Elevating Base

1. Main Bracket..... 6600-1183-500
2. Flat Washer, ..... M86600-0712-406
3. Nut, M8 ..... 6600-0714-405
4. Lower Shroud ..... M1078152
5. Cover Shroud ..... M1078156
6. Leg Casting..... 6600-1599-500
- 7a. SVCE Kit Canopy Fswitch Gray ..... 2081691-001  
(Includes one pedal and labels for both left and right pedals.  
Can be used on left or right side.)
- 7b. SVCE Kit Canopy Fswitch/Ebase Ped Set Gray ... 2081689-001  
(Includes two gray pedals for base and two gray pedals for the canopy.)
- 7c. SVCE Kit Ebase Pedal Gray..... 2081688-001
- 7d. SVCE Kit Ebase Pedal Set Gray ..... 2081690-001
8. Screw, 2.9 x 9.5 Pan Head..... 6600-0709-409
9. Flat Washer, M3..... 6600-0712-448
10. Twist Lock ..... 6600-1197-600
11. Speaker..... 6600-1168-600
12. Lock Washer, M12..... 6600-0713-408
13. Screw, M12 x 20 button head..... 6600-0706-449
14. Caster ..... 6600-0890-400
15. Screw, Button head M8 x 1..... 6600-0706-435
16. Cover Assy Leg Wiring East..... 6600-1545-700
17. Cover Assy Leg Wiring West ..... 6600-1546-700
18. Washer Ext Lock M6..... 6600-0713-445
19. Screw, M6 x 12 button head ..... 6600-0706-427
20. Lock Washer, M6 ..... 6600-0713-405
21. Screw M6 x 45 Button head..... 6600-1117-402
22. Mounting Plate..... 6600-1186-500
23. Elevating Column..... 6600-0753-701
24. Flat Washer, M6..... 6600-0712-405
25. Screw, M12 x 45 Button Head..... 6600-0706-449
26. Screw, M4 x 10 Button Head..... 6600-0706-409
27. Lock Washer, M4 ..... 6600-0713-403
28. Flat Washer, M4 ..... 6600-0712-403
29. Upper Shroud..... M1078154
30. Screw, M5 x 10 Button Head..... 6600-0706-417
31. Lock Washer, M5 ..... 6600-0713-404
32. Flat Washer, M5 ..... 6600-0712-409
33. Hood Lift Pedal (gray).....M1108743  
(Includes one pedal and labels for both left and right pedals.  
Can be used on left or right side.)
34. Hood/Base Lift Pedals, set of four (gray)..... M1108795  
(Includes two gray pedals for base and two gray pedals for the canopy.)
35. Hood Lift Pedal Assy., all gray.....M1108795
36. Screw, M12 Button Head.....6600-0706-448
37. Screw, M8 x 16 Skt. Hd. .... 6600-0707-427
38. Lock Washer, split ring M8..... 6600-0713-406



Elevating Base

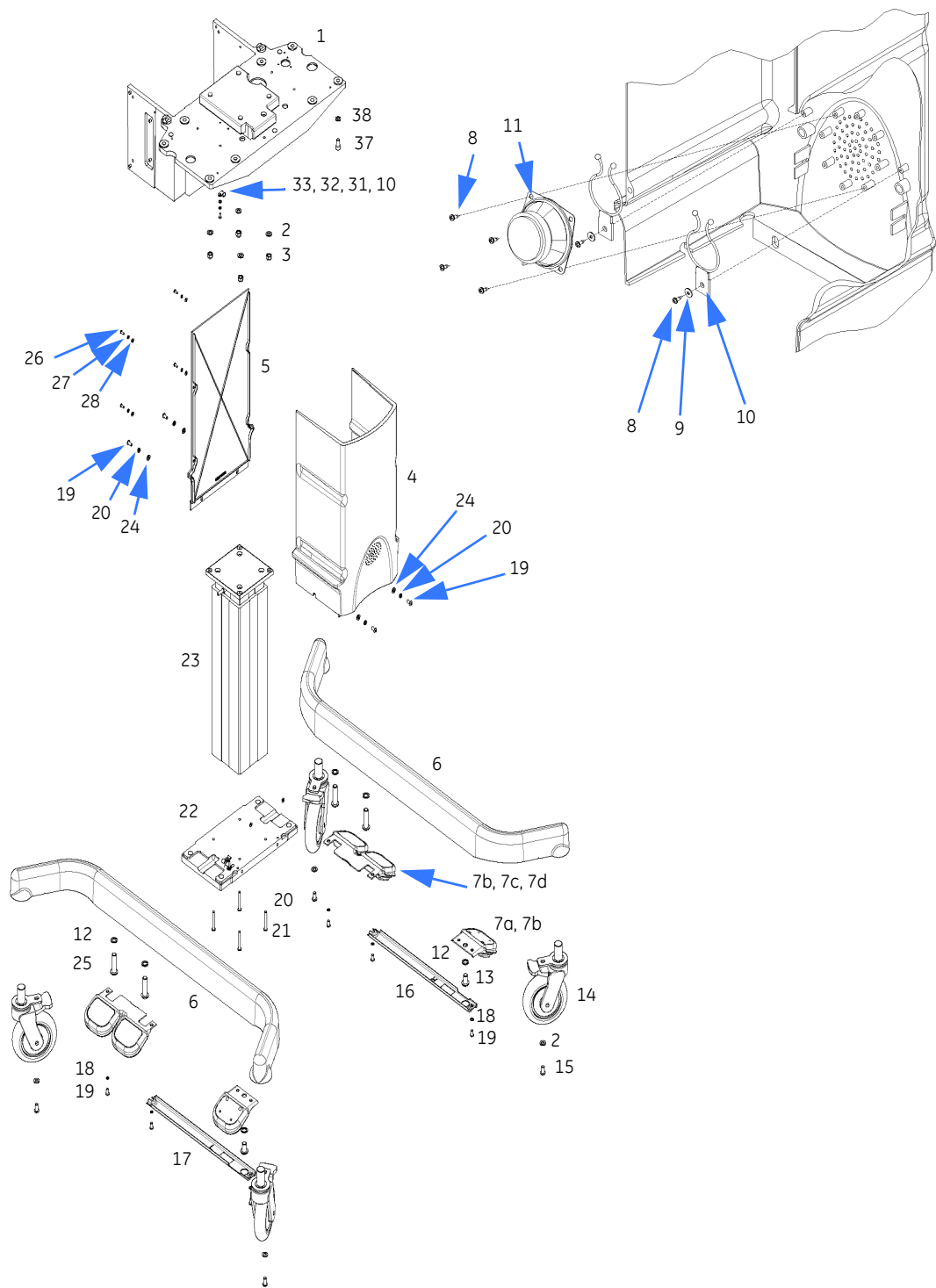


FIGURE 8-17. Base and Elevating Column

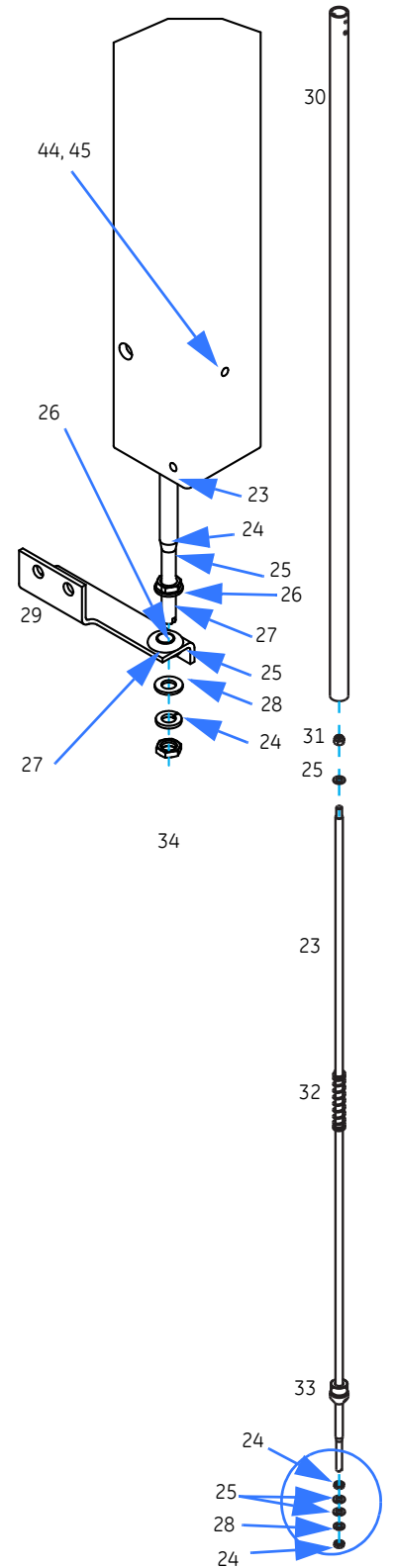
### 8.13 Uprights and Lift Rail Components

1.	Lift rail .....	6600-1332-500
2.	Lift motor isolator .....	6600-1099-400
3.	Lift motor bracket.....	6600-1767-500
4.	Flat washer, M4.....	6600-0712-403
5.	Split ring lock washer M4.....	6600-0713-403
6.	Screw, M4 x 6 Button Head.....	6600-0707-407
7.	Belt channel .....	6600-1312-500
8.	Right (east) upright@.....	6600-1189-500
9.	Pinch guard .....	6600-1383-500
	Circular loop fastener (order when ordering pinch guard) .....	6600-1177-400
10.	Roll pin.....	6600-1093-400
11.	Screw, M5 x 2 socket head cap .....	6600-0706-421
12.	Side roller pin**.....	6600-1098-400
13.	Screw, M4 x 10 socket head cap .....	6600-0707-409
14.	Split ring lock washer, M4.....	6600-0713-403
15.	Side roller**.....	6600-1450-500
16.	Side roller bracket** .....	6600-1451-500
17.	Roller .....	6600-1770-500
18.	Retaining ring .....	6600-1182-400
19.	Pin guide .....	6600-1496-500
20.	Bracket.....	6600-1483-500
21.	Split ring lock washer, M5.....	6600-0713-404
22.	Screw, M5 x 10 Button Head .....	6600-0706-417
23.	Rod.....	6600-1390-500
24.	Nut M5.....	6600-0711-408
25.	Flat washer M5 .....	6600-0712-404
26.	Brass spacer.....	6600-1186-400
27.	Grommet.....	6600-1187-400
28.	Split ring lock washer.....	6600-0713-404
29.	Bracket.....	6600-1389-500
30.	Tube.....	6600-1391-500
31.	Nylok nut, M5.....	6600-0714-403
32.	Spring* .....	6600-1101-400
33.	Cap .....	6600-1410-500
34.	Spring tube assembly (items 23-33).....	6600-0854-700
35.	Hole plug.....	6600-1150-400
36.	Cable clamp .....	6600-1060-400
37.	Screw, M4 x 2 .....	6600-0707-412
38.	Screw, M4 x 8.....	6600-0706-408
39.	Nut, M4 .....	6600-0711-407
40.	Motor and gear box kit.....	M1189526
41.	Set-screw .....	6600-0715-408
42.	M4 x 20 socket head cap.....	6600-0707-412
43.	Screw M5 .....	6600-0708-414
44.	Spacer .....	6600-1751-500
45.	Rivet .....	6600-1116-400
46.	Washer Int star M5 .....	6600-0713-433
47.	Washer Flat M5 .....	6600-0712-404
48.	Gearbox coupler.....	6600-1176-400

\* Apply Lubriplate to spring to dampen noise.

@ Order labels 6600-2347-101 and 6600-2341-1XX when replacing upright.  
Refer to section "8.19 Labels".

\*\* The side roller pin, side roller bracket, and side roller should be ordered together and assembled with pliers to press in the pin.



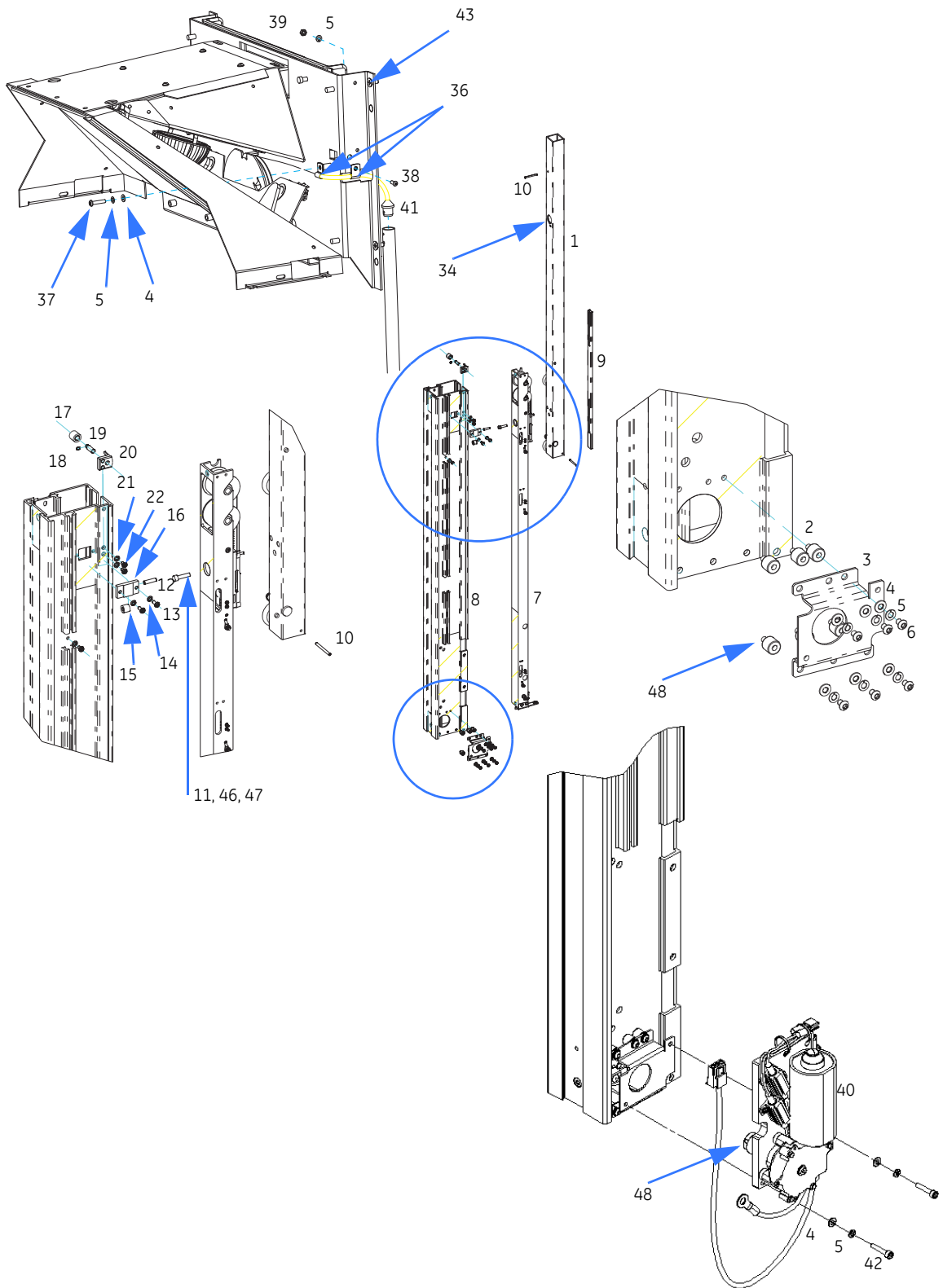


FIGURE 8-18. Right (East) Upright Parts, Motor Side (Complete East Rail Assembly: 6600-0290-850)  
Motor Not included

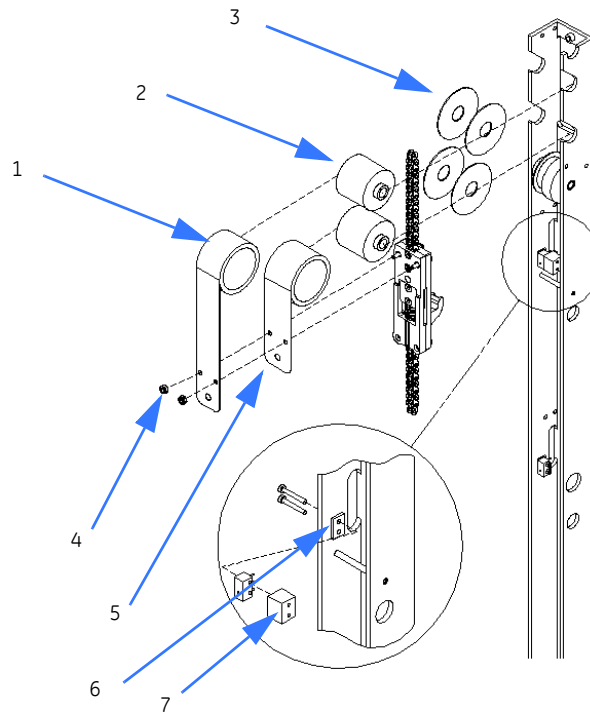


1. Upper buoyancy spring* .....	6600-1464-500
2. Spool .....	6600-1317-500
3. Plastic washer .....	6600-1708-500
4. Lock nut, M3 .....	6600-0714-401
5. Lower buoyancy spring* .....	6600-1465-500
6. Spacer .....	6600-1491-500
7. Belt switch assembly guide .....	6600-1769-500

Parts Not Shown

Micro-switch (part of switch harness) .....	Refer to wiring diag.
Switch hardware	
Screw, M2 x 16 fillister head .....	6600-0710-408
Split ring lock washer, M2 .....	6600-0713-401
Nut M2 .....	6600-0711-401
Nut M3 .....	6600-0711-403
Screw M3 x 16 Flat head .....	6600-0708-405
Grooved Pin .....	6600-1185-400

\*Replace all the buoyancy springs at one time.



**Metal Lift Belt U-Channel Assembly**

Parts not listed above are not orderable. Order the Metal Lift Belt U-Channel Assembly (2074711-001). This single assembly replaces the need to replace piece parts within the assembly and is expected to perform more reliably.



**FIGURE 8-19. Belt Channel - 1 (Lift Motor Side)**

1. Washer .....	6600-1088-400
2. Outer roller .....	6600-1318-500
3. Short bearing .....	6600-1086-400
4. Lock washer, internal tooth .....	6600-0713-434
5. Screw, M6 x 16 button head .....	6600-0706-428
6. Inner roller .....	6600-1750-500
7. Stepped bushing .....	6600-1749-500
8. Screw, M6 x 20 button head .....	6600-0706-429
9. Screw, M5 x 20 socket head .....	6600-0707-480
10. Standoff .....	6600-1740-500
11. Rail brake pad .....	6600-1161-400
12. Roller bracket post assembly .....	6600-0809-700
13. Roller tensioning spring (left/west) .....	6600-1162-400

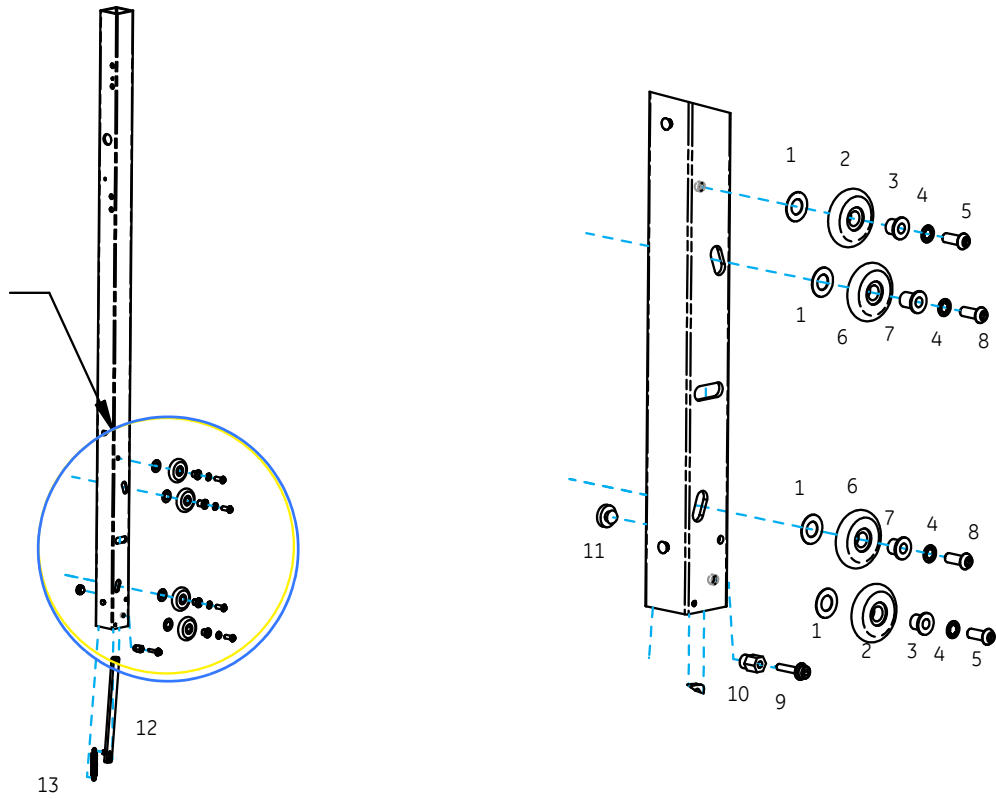


FIGURE 8-20. Lift Rail (Both Sides)

1. End cap, top inside left (west) .....	6600-1339-500
2. Roll pin .....	6600-1095-400
3. Spring .....	6600-1089-400
4. End cap, top outside left (west) .....	6600-1340-500
Circular loop fastener (order when ordering end cap).....	6600-1177-400
5. Screw, M4 .....	6600-0708-409
6. End cap, top inside right (East) .....	6600-1468-500
7. End cap, top outside right (East).....	6600-1337-500
Circular loop fastener (order when ordering end cap).....	6600-1177-400
8. Decorative strip (teal).....	6600-1456-501
9. End cap, bottom right (East) .....	6600-1463-500
10. End cap, bottom left (west).....	6600-1341-500
11. Cord wrap.....	6600-1482-500
12. Routing clips (6).....	6600-0055-851
13. Countersunk washer (2).....	M1089713
14. Ground Harness .....	6600-0833-700
15. Washer Int star M4 .....	6600-0713-432
16. Screw M6 .....	6600-0706-428
17. Washer Int star M6 .....	6600-0713-434
18. Screw M4 x 8 .....	6600-0707-408
19. Dog point set screw .....	6600-1124-400

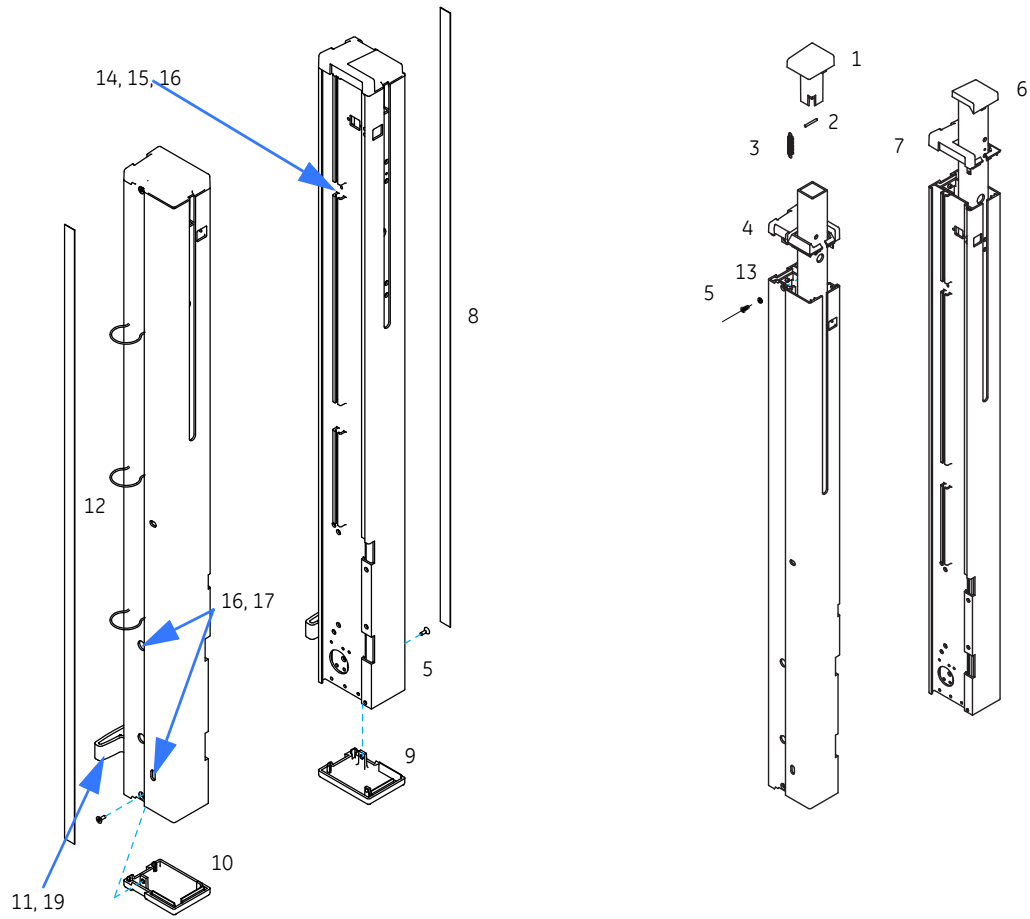
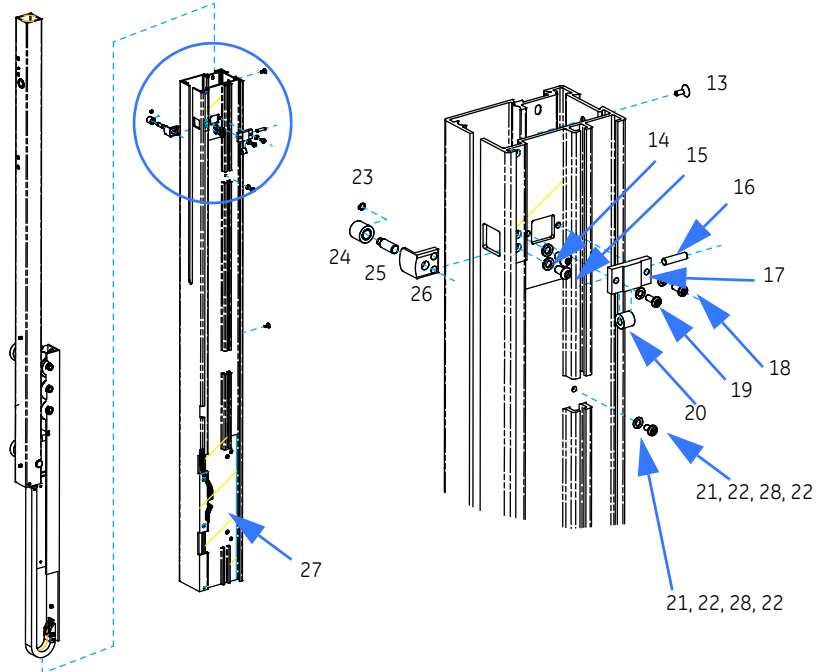


FIGURE 8-21. Rail End Caps



1. Spring, upper*	6600-1464-500
2. Spring, lower*	6600-1465-500
3. Spring, left (west) only*	6600-1725-500
4. Screw, M5 x 20 socket head	6600-1152-400
5. Spacer	6600-1103-400
6. Roll pin	6600-1093-400
7. Stop block, left (west) only	6600-1712-500
8. Heater wire harness/cable carrier assembly***	6600-0710-700
9. Spring bracket, left (west) only	6600-1350-500
10. Spring spool	6600-1317-500
11. Plastic washer	6600-1708-500
12. Lift rail	6600-1333-500
13. Screw, M4 x 12 flat head socket	6600-0708-409
14. Split ring lock washer, M5	6600-0713-404
15. Screw, M5 x 10 button head socket	6600-0706-417
16. Side roller pin**	6600-1098-400
17. Side roller bracket**	6600-1451-500
18. Screw, M4 x 10 socket head	6600-0707-409
19. Split ring lock washer M4	6600-0713-403
20. Side roller**	6600-1450-500
21. Screw, M4 x 8 socket head	6600-0707-408
22. Star washer M4 Int	6600-0713-432
23. Retaining ring	6600-1182-400
24. Front roller	6600-1770-500
25. Front roller pin	6600-1496-500
26. Front roller bracket	6600-1483-500
27. Left (west) upright	6600-1204-500
28. Ground Harness	6600-0883-700
29. Rivet	6600-1160-400
30. Snap Bushing	6600-0037-500
31. Cable Tie	6600-0384-400

\*Replace all the buoyancy springs at one time.

Uprights and Lift Rail Components

\*\* The side roller pin, side roller bracket, and side roller should be ordered together. Use pliers to press the pin into the side roller bracket.

\*\*\* When ordering this assembly, also order 6600-1097-603, unless you have a pin extractor. For details, refer to section 7.5.5.

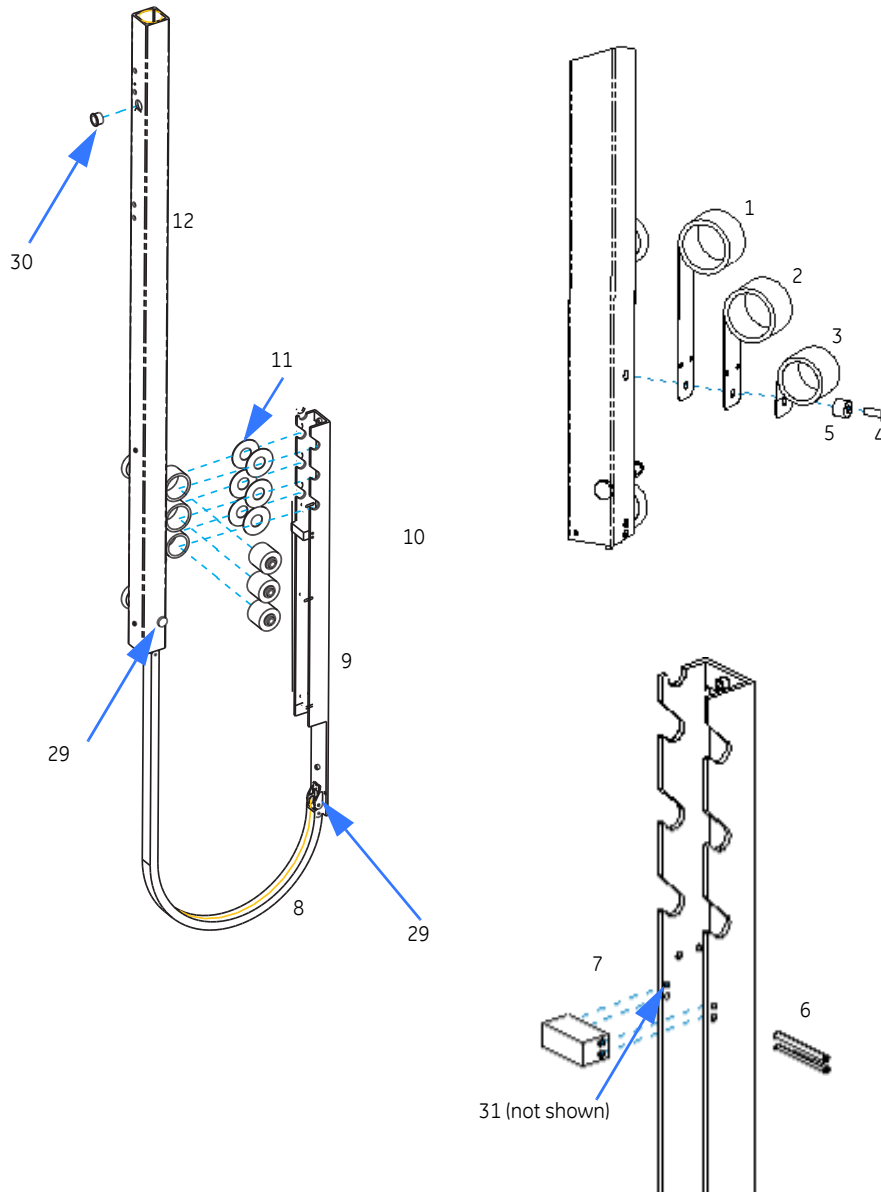


FIGURE 8-22. Left (West) Upright (Complete West Rail Assembly: 6600-0290-851)



## 8.14 Compartment Sensor

1. Compartment Sensor@.....	2075908-001
Probe wire harness@.....	6600-1513-700
2. O-ring .....	6600-0540-400
2a. Shim washer**.....	2103116-001
3. Humidity sensor assembly*.....	6600-0784-700
4. Retainer .....	6600-1475-500
5. Break plate.....	6600-1473-500
6. Screw, M3 x 6 button hd.....	6600-0706-406
7. Back plate .....	6600-1474-500
8. Flat washer, M3.....	6600-0712-402
9. Split ring lock washer.....	6600-0713-402
10. Screw, M3 x 20 button hd.....	6600-0706-404
11. Screw, M4 button hd.....	6600-0706-411
12. Cable clamp.....	6600-0144-400
13. Lock nut, M4.....	6600-0714-402

### Parts Not Shown

Humidifier Calibration Kit* .....	6600-0048-850
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\*\*Service kit 2103116-001 contains 10 shim washers (2098085-001).

\*Device must be recalibrated using Humidifier Calibration Kit whenever sensor is replaced.

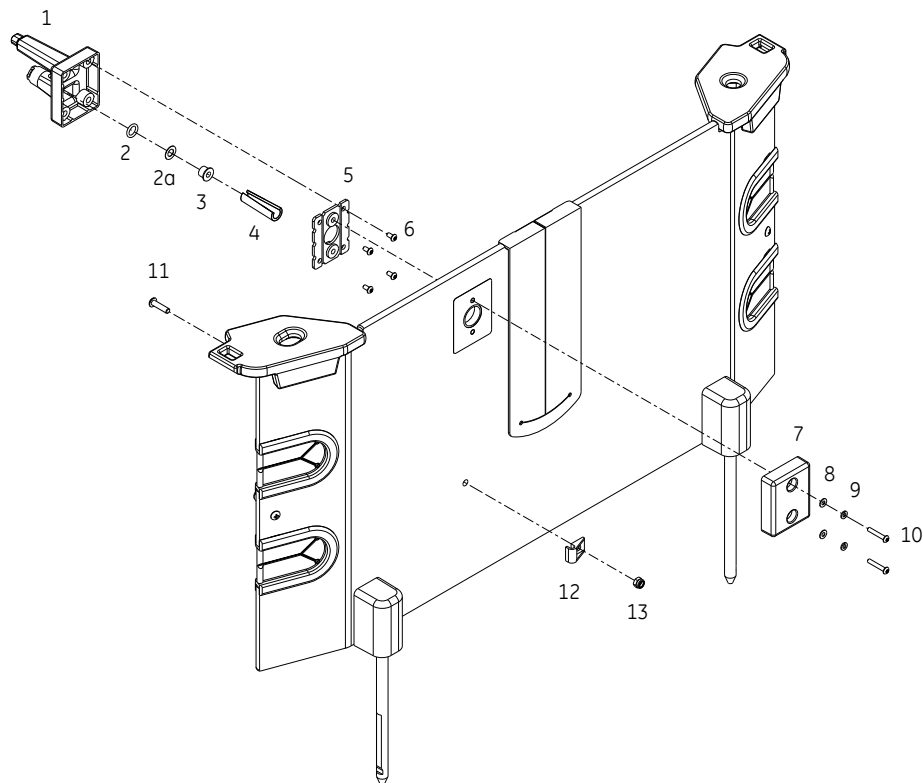


FIGURE 8-23. Compartment Sensor

## 8.15 Servo Control Oxygen

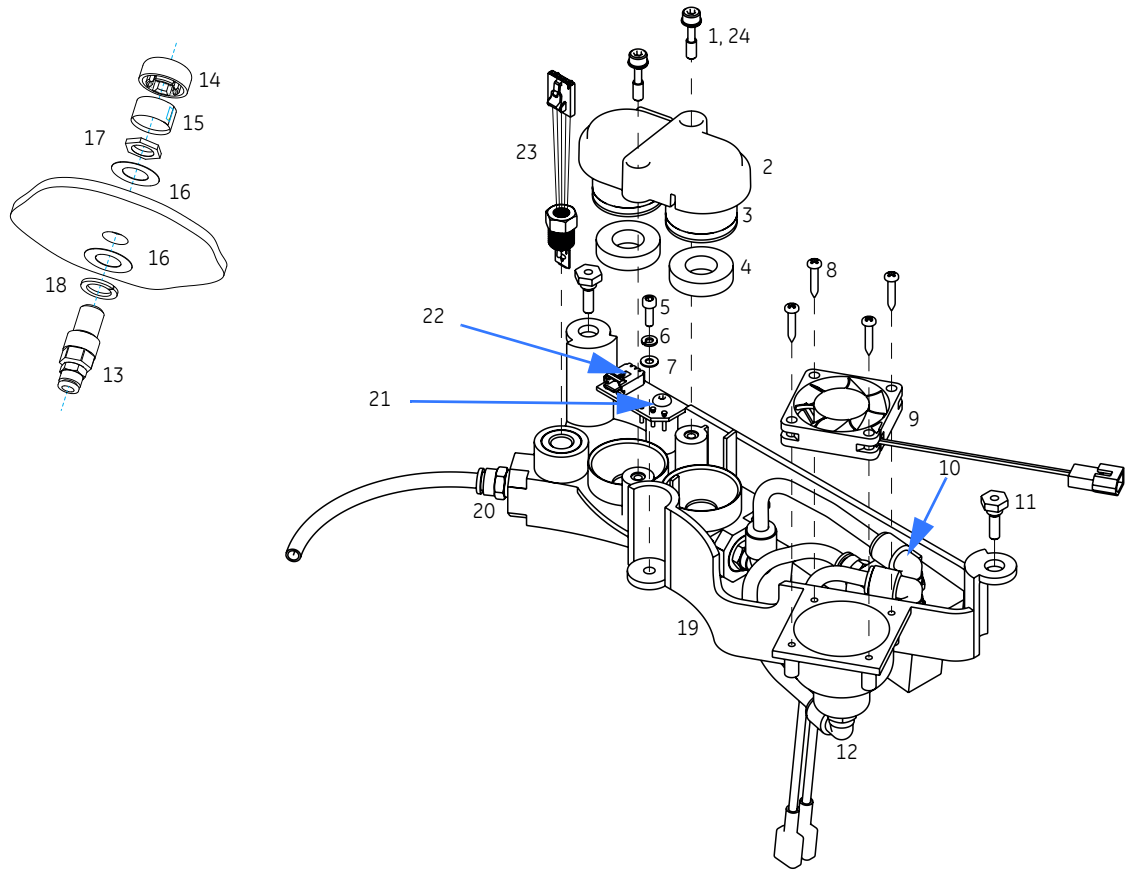
1.	Screw, M4 Skt Hd.....	6600-0868-402
2.	Sensor housing cover .....	6600-1876-500
3.	Oxygen sensor kit (2 pcs).....	2084419-001
4.	Sensor gasket.....	6600-1887-500
5.	Screw, M3x10L Skt Hd.....	6600-0707-403
6.	Split ring washer, M3 .....	6600-0713-402
7.	Flat washer, M3 .....	6600-0712-402
8.	Screw, M2.9x16L, self tap.....	6600-0709-411
9.	Calibration fan with harness* .....	6600-1510-700
10.	Calibration valve assembly (includes gasket).....	6600-1539-700
	Calibration valve mounting screws (2)- M4x12L FI Hd Skt.....	6600-0708-409
11.	Male/female shoulder screw .....	6600-0862-400
12.	Push fitting, 90 degree elbow .....	6600-0865-400
13.	Chassis Vent .....	6600-2017-500
14.	Vent cover.....	6600-2018-500
15.	Vent screen .....	6600-2020-500
	Vent screens (5).....	6600-0271-850
16.	Washer (thin).....	6600-1236-400
17.	Panel hex nut .....	6600-1275-400
18.	M12 Split ring washer .....	6600-0713-408
19.	Sensor housing .....	6600-1875-500
20.	Push fitting, straight .....	6600-0877-400
21.	Screw, M4x6L Button Hd.....	6600-0706-407
22.	Sensor housing board (also includes the board inside the sensor housing cover).....	2065736-001
23.	Sensor plug assembly.....	6600-0604-700
	Sensor housing assembly (includes all parts above except item 3).....	6600-1506-700
24.	Star washer, int. M4 .....	6600-0713-432

## Tubing (order by inch)

6 mm black.....	6600-0129-300
from sensors to manifold, 3.9"	
from chassis vent to manifold, 3.9"	
6 mm white.....	6600-0866-400
from cal fan to manifold, 4.7"	
from manifold to heatsink vent, 4.7"	

\* Install fan so flow arrow on side points up into chassis.

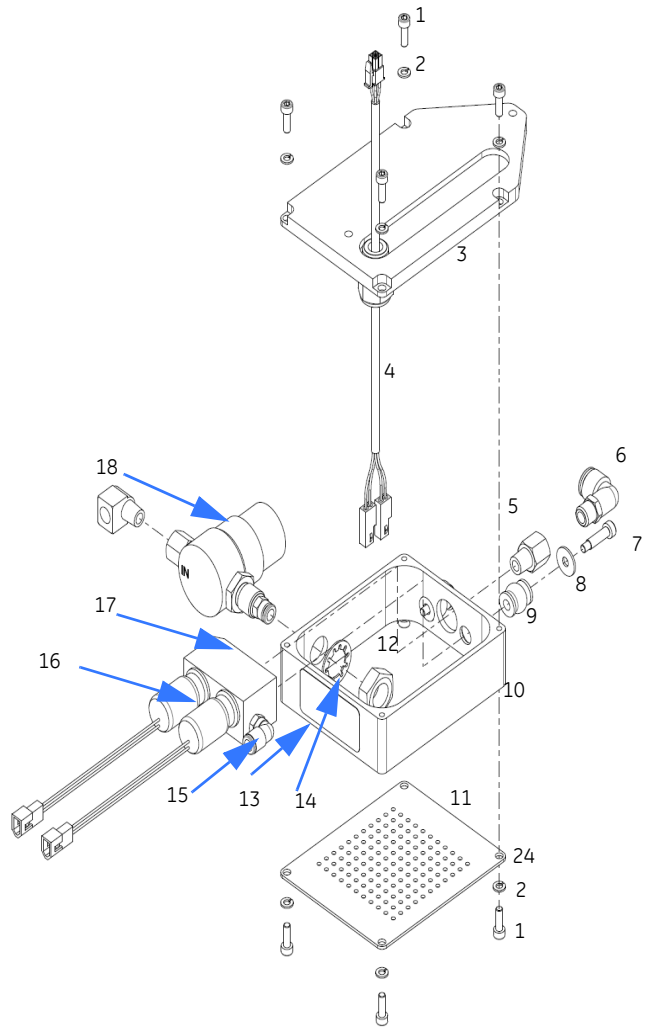
@ The date on the sensor is a discard date; the sensor should be removed from service on that date.



**FIGURE 8-24. Servo Control Oxygen Sensor Housing Assembly  
(Servo O2 Upgrade Kit 6600-0678-800)**

Servo Control Oxygen

1. Screw, M4x12L Skt Hd.....	6600-0707-410
2. Split ring washer, M4 .....	6600-0713-403
3. Valve housing top cover .....	6600-1838-500
4. Valve housing wire harness.....	6600-1069-700
5. Adapter 1/8NPTFx1/8NPTM.....	6700-0616-800
6. Elbow fitting 10 OD x1/8NPT .....	6600-0873-400
7. Screw, M4 Skt Hd.....	6600-1051-400
8. Flat washer, M5 .....	6600-0712-409
9. Damper manifold mount .....	6600-1248-400
10. Valve housing.....	6600-1836-500
11. Valve housing bottom cover .....	6600-1837-500
12. Jam nut, M14.....	6600-0711-450
13. Label Max kPa6.....	600-2448-101
Label Max PSI.....	6600-2448-102
14. Lock washer, M14 Int tooth .....	6600-0713-438
15. Push-in fitting, 90° Elbow .....	6600-0865-400
16. Supply valve.....	6600-0602-700
17. Manifold.....	6600-1839-500
Plug.....	0413-3510-335
Gasket .....	6600-1950-500
18. Regulator assembly.....	6600-0254-850
In-line screen fitting .....	6600-1249-400
19. O2 adapter, Air Liquide .....	M1230430
20. O2 adapter, DIN .....	6700-0050-700
21. O2 adapter, NIST.....	6600-0100-400
22. O2 adapter, DISS.....	6700-0522-800
23. O2 adapter SIS .....	M1139871
24. Washer, M4 .....	6600-0712-403
Parts Not Shown	
Oxygen inlet label (green).....	6600-2611-101
Valve housing assembly (includes all parts above except items 11, 13 and mounting hardware).....	6600-1507-700
6 mm Tubing (order by inch).....	6600-0866-400
From regulator to manifold, 3.9"	
Tubing/sleeve assembly .....	6600-0262-850
10 mm tube from valve housing to expansion chamber, 27"	



19



20



21



22



23

FIGURE 8-25. Servo Control Oxygen Valve Housing

Servo Control Oxygen

- 1. Screw, M4 Skt Hd.....6600-0706-409
  - 2. Split ring washer, M4 .....6600-0713-403
  - 3. Flat washer, M4.....6600-0712-403
  - 4. Expansion chamber cover.....6600-1878-500
  - 5. Cover gasket .....6600-1883-500
  - 6. Elbow fitting .....6600-0873-400
  - 7. Expansion chamber assembly  
(includes items 1-6).....6600-0256-850
  - 8. Vent .....6600-1881-500
  - 9. Washer (thick).....6600-1219-400
- Parts Not Shown
- P-clamp (under Pleur-evac holder).....0690-1240-331
  - Washer, M6 (under Pleur-evac holder).....6600-0712-405
  - Expansion chamber inlet gasket .....6600-1884-500

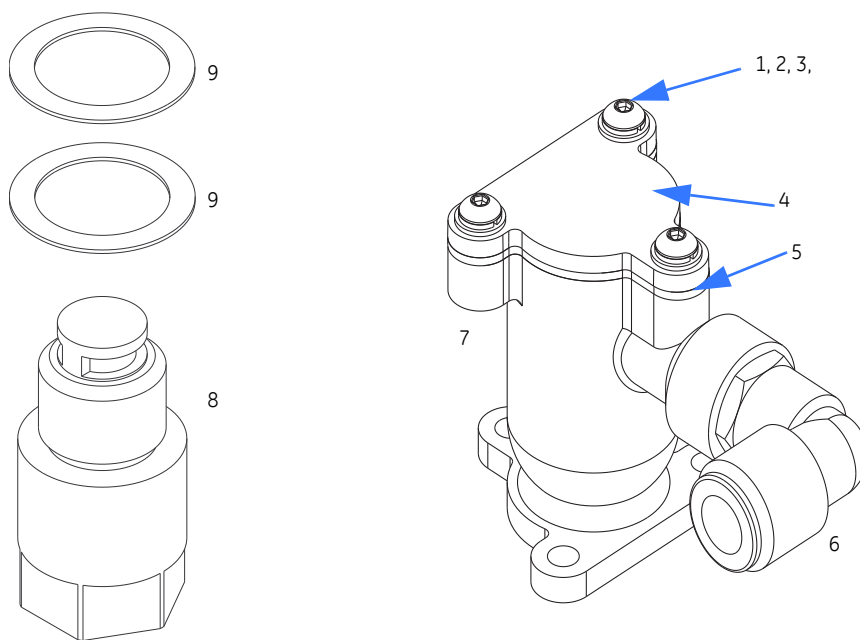


FIGURE 8-26. Expansion Chamber/Heatsink Vent

1. Nylok nut, M4..... 6600-0714-402
2. Cooling fan assembly\* ..... 6600-1523-700
3. Flat washer, M4..... 6600-0712-403
4. Screw, M4x20L Button Hd..... 6600-0706-412
5. Screw, captive 8 mm long..... 6600-0868-401
6. Screw, SEMS M4 x 6 Button Hd..... 6600-0908-402

Parts Not Shown

- Cable tie ..... 6600-0384-400

\*Install the fan so that the flow arrow on the side points down, away from chassis.

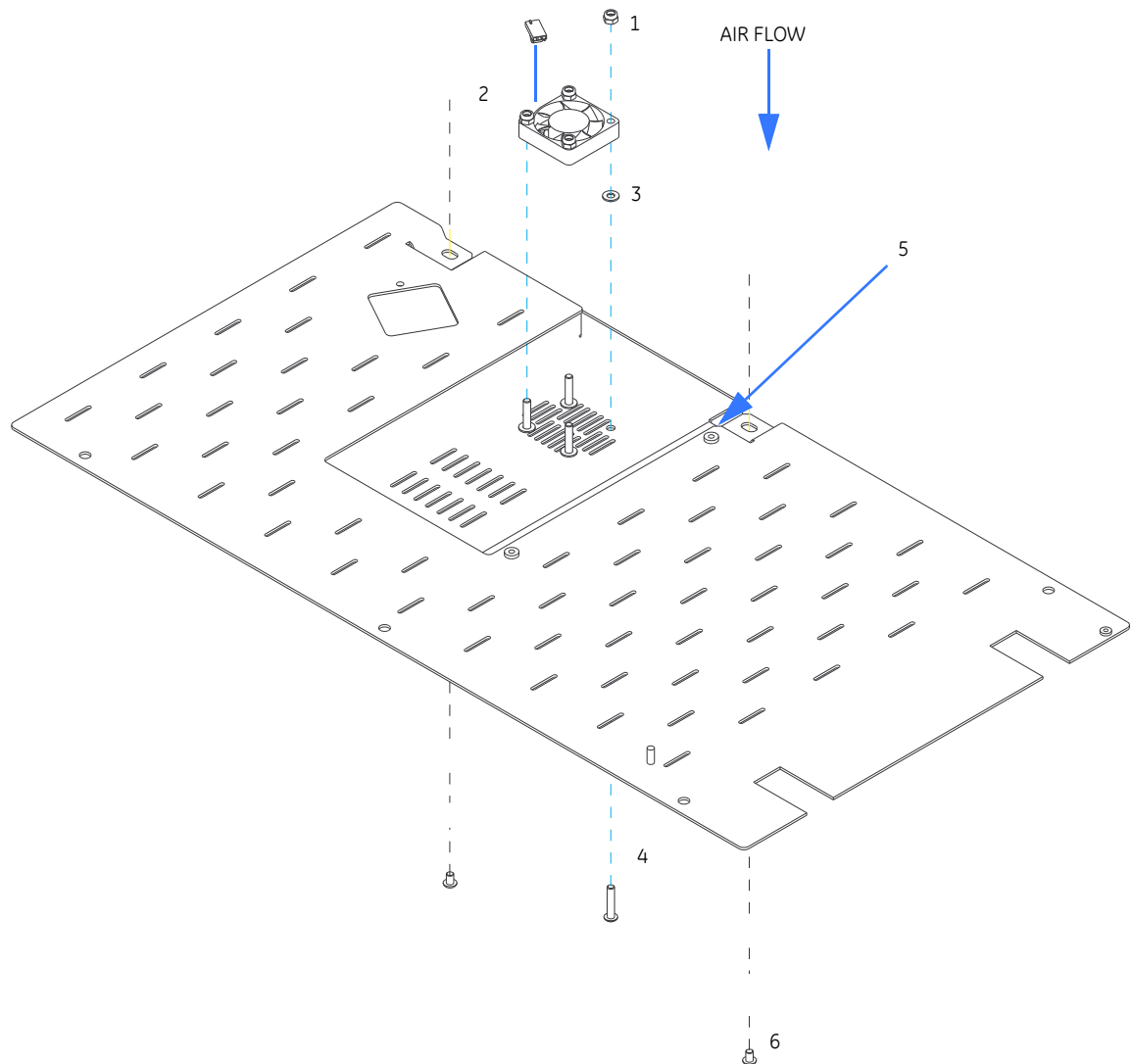


FIGURE 8-27. Servo Control Oxygen Cooling Fan

Servo Control Oxygen

- 1. Servo Oxygen PCB..... 2080447-001
- 2. Card guide, black ..... 6600-1064-400
- 3. Card guide, white..... 6600-1183-400
- 4. Nut, M3 ..... 6600-0711-403
- 5. Lock washer, int. tooth ..... 6600-0713-431

Parts Not Shown

- EPROM (U6) ..... 6600-0255-850
- In-line fuse cable\* ..... 2074950-001
- ESU label (located on probe panel)..... 6600-2540-101

\*Fuse is not replaceable; you must order cable to replace fuse.

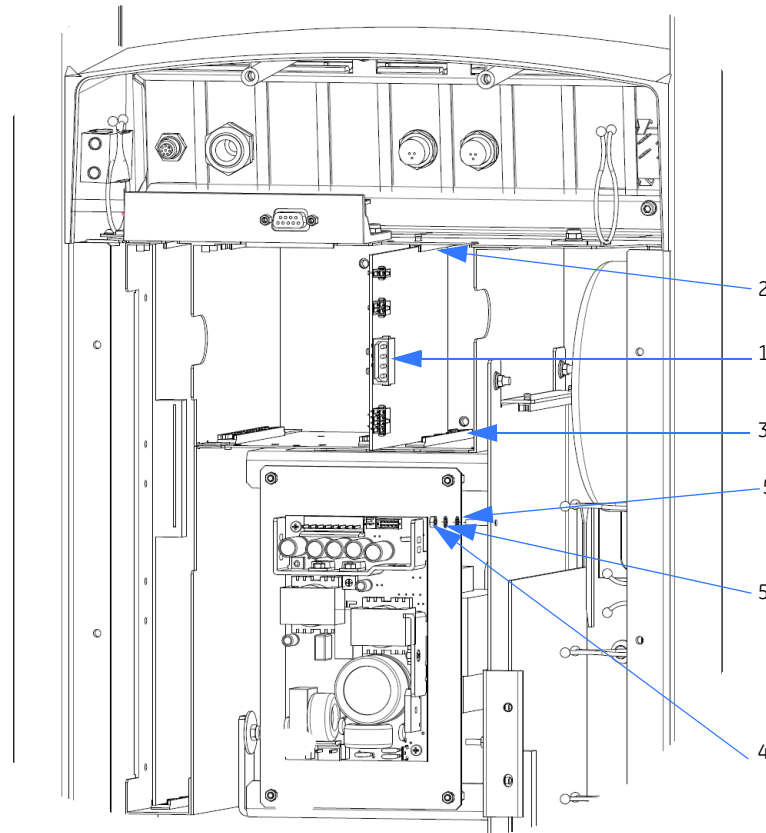


FIGURE 8-28. Servo Control Oxygen PC Board



1. Screw, M4 x 10 flt.hd. .... 6600-0715-418
2. Split ring washer, M4 ..... 6600-0713-403
3. Spring Cover ..... 6600-2025-500
4. Valve retaining tube ..... 6600-2016-500
5. Spring kit ..... 6600-0273-850
6. Two-way valve\* ..... 6600-1272-400
7. Manifold retaining pin ..... 6600-2013-500
8. Screw, M4 x 25 btn. hd. .... 6600-0706-413
9. Manifold endcap ..... 6600-2012-500
10. Screw, M4 flt. hd. .... 6600-0708-409
11. Elbow fitting 10 x 1/8 NPT ..... 6600-0873-400
12. Tube 10 x 6.5 ID w sheath ..... 6600-0274-850

\*When replacing the valve or O-ring, lubricate its two O-rings with Vac Kote (6700-0092-200).

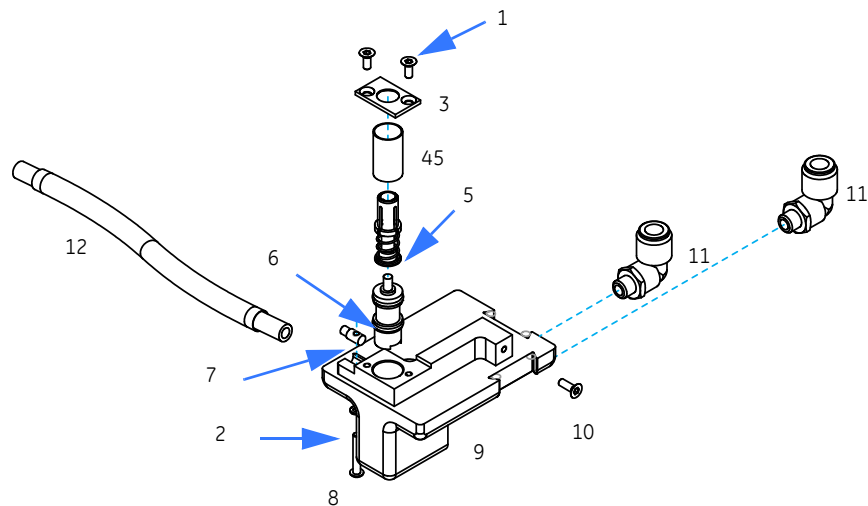


FIGURE 8-29. Manifold Endcap Safety Valve

### 8.16 Storage Drawer

- 1. Drawer slide ..... 6600-1717-500
- 2. Drawer mounting bracket front (south) ..... 6600-1781-500
- 3. Screw, M4 x 12 Button HD ..... 6600-0706-410
- 4. Screw, M4 x 8 Button HD ..... 6600-0706-408
- 5. Storage drawer ..... 6600-1279-500
- 6. Screw, M5 x 12 Button HD Nylok ..... 6600-0715-410
- 7. Star washer, M5 internal tooth ..... 6600-0713-433
- 8. Drawer mounting bracket\*, rear (north) ..... M1172111
- 9. Tray ..... 6600-1718-500
- 10. SEMS button head screw M4 x 8 ..... 6600-0908-403
- 11. Label Drawer Handle Blue ..... 6600-2403-101

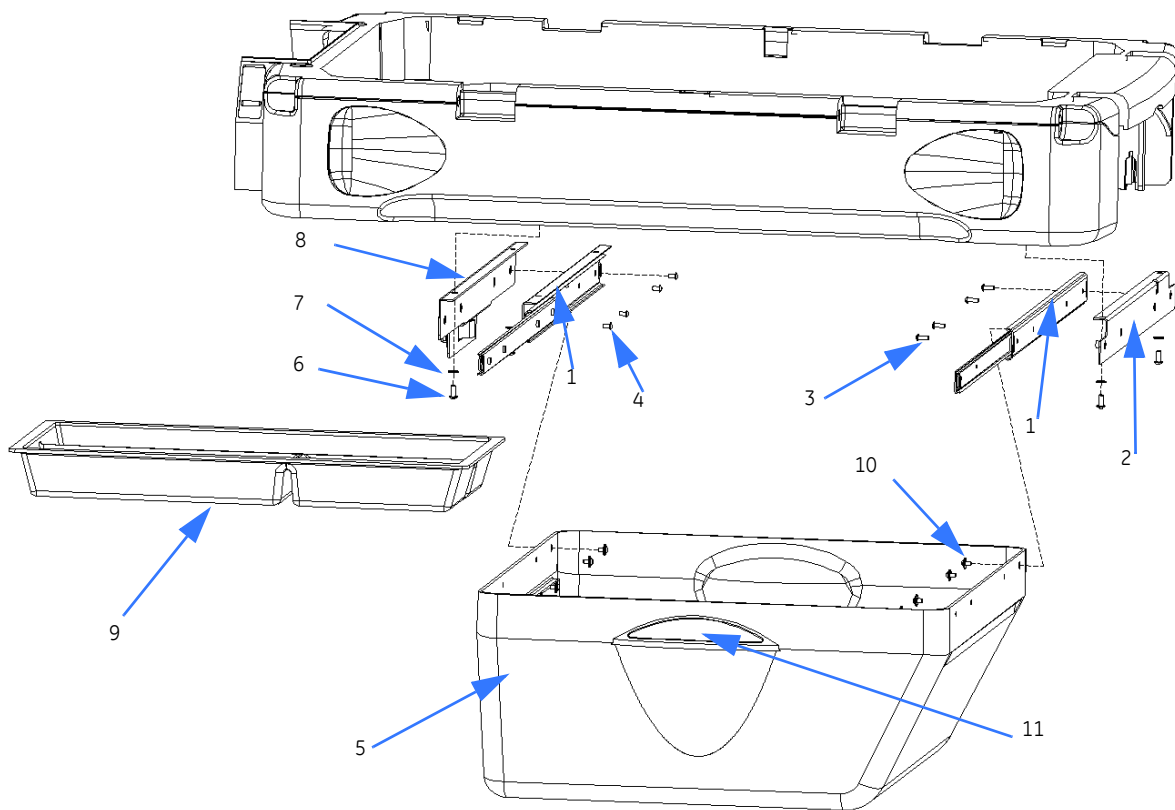


FIGURE 8-30. Storage Drawer

## 8.17 Options

1. Weight limit label..... 6600-1839-101
2. Shelf (order item 1 when replacing shelf)..... 6600-1733-500
3. Pawl Block ..... M1171928

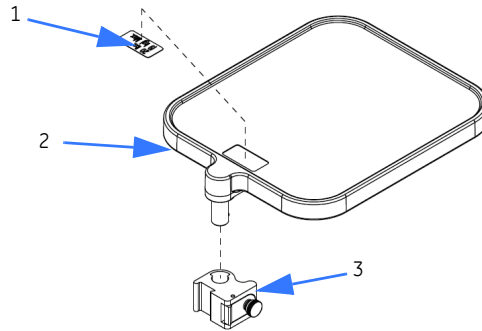


FIGURE 8-31. Instrument Shelf CN (M1082912)

Options

- 1. Shelf (order item 2 when replacing shelf)..... 6600-0481-501
- 2. Weight limit label..... 6600-1941-101  
Weight limit label CN ..... M1052590
- 3. Shelf support..... 6600-0811-501
- 4. Mounting block assembly..... 6600-0290-800
- 5. Screw, 1/4 - 20 x 5/8..... 6600-0394-400

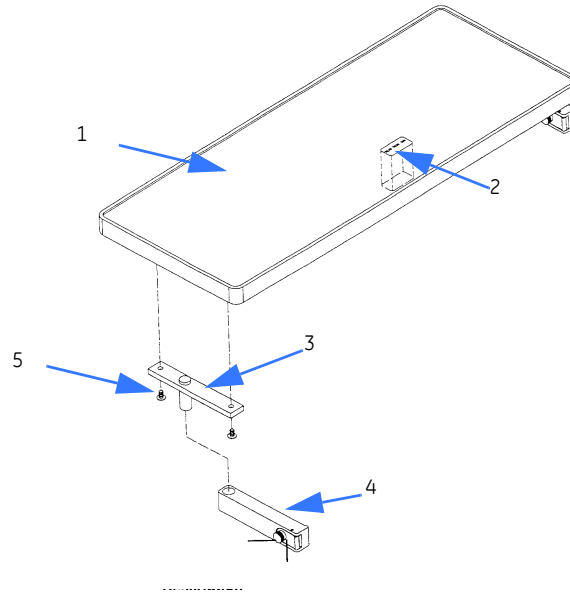


FIGURE 8-32. Monitor Shelf CN (M1082910)

- 1. Cylinder Holder Assembly..... M1151570
- 2. E-Cylinder Holder..... 6600-0836-800
- 3. Cylinder Holder Assembly, XL ..... M1151571

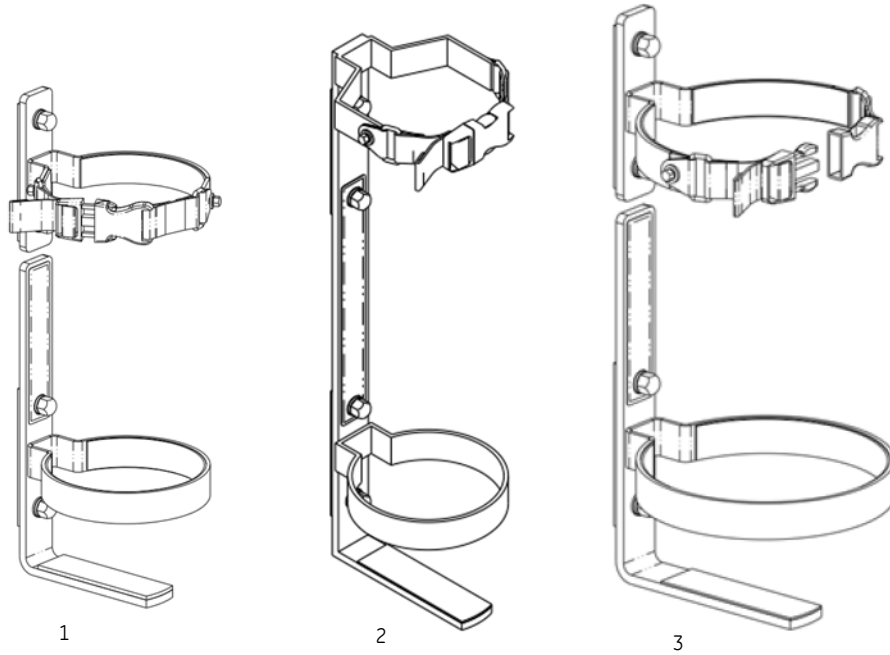
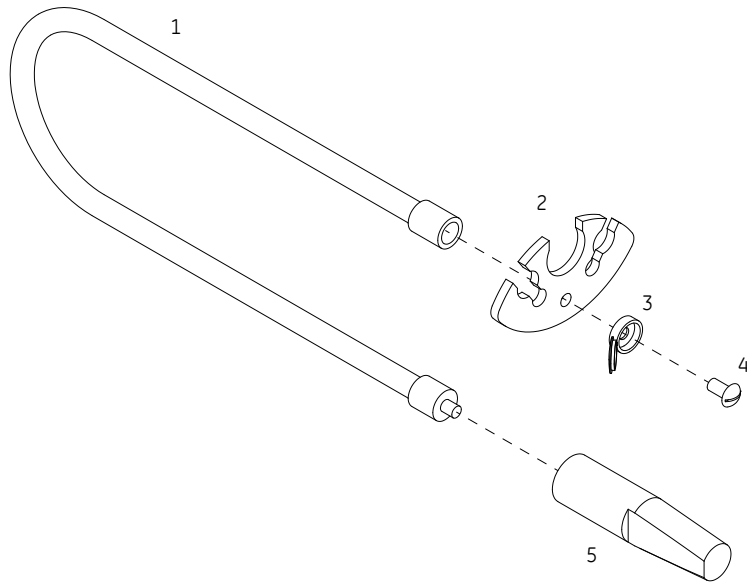


FIGURE 8-33. Cylinder Holders

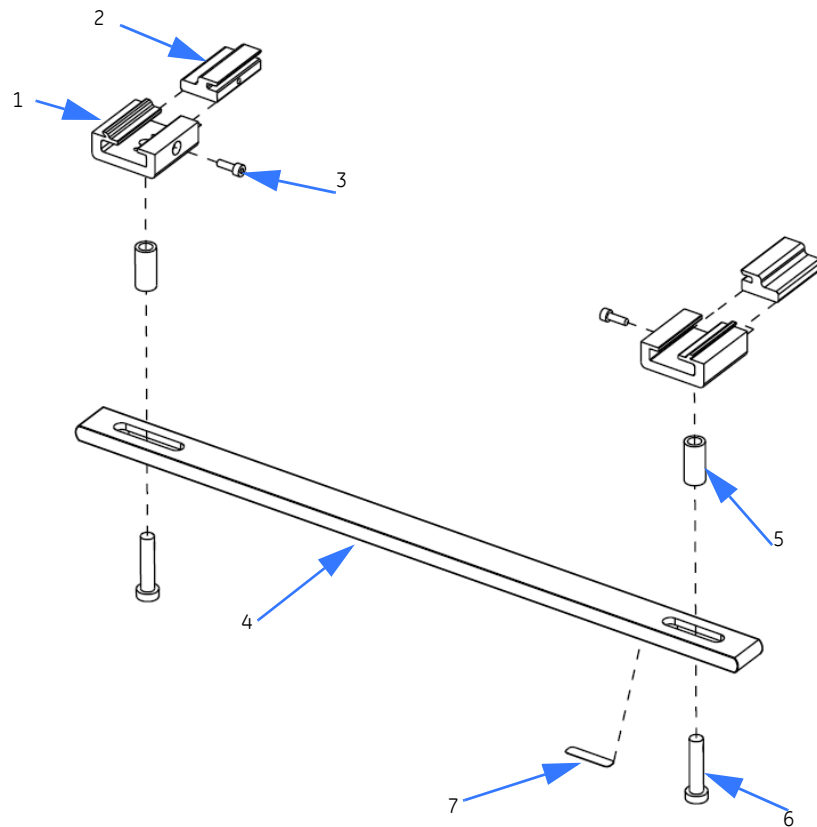
Options

- 1. Goose neck ..... 6600-1866-500
- 2. Tubing plate ..... 6600-1862-500
- 3. Screw cover ..... 6600-1206-403
- 4. Screw, pan hd. .... 6600-1213-400
- 5. Mount ..... 6600-1845-500

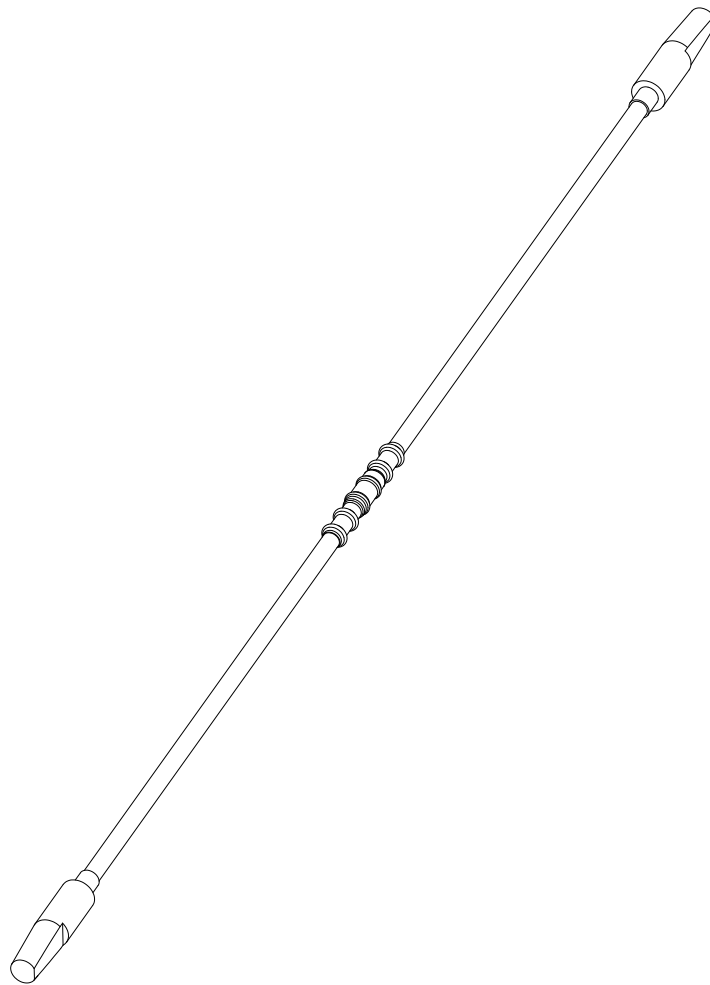


**FIGURE 8-34. Tubing Management Arm (6600-0837-800)**

1. Mounting bracket housing ..... 6600-1541-500
2. Mounting bracket lock ..... 6600-1542-500
3. Screw, M4 x12 ..... 6600-0853-400
4. DIN rail ..... 6600-1540-503  
(Order item 7 at the same time.)
5. Spacer ..... 6600-1538-500
6. Screw, M8 x 35 Skt Hd ..... 6600-0852-400
7. Weight limit label ..... M1160984



**FIGURE 8-35. Dovetail Mount DIN Rail (6600-0659-803)**

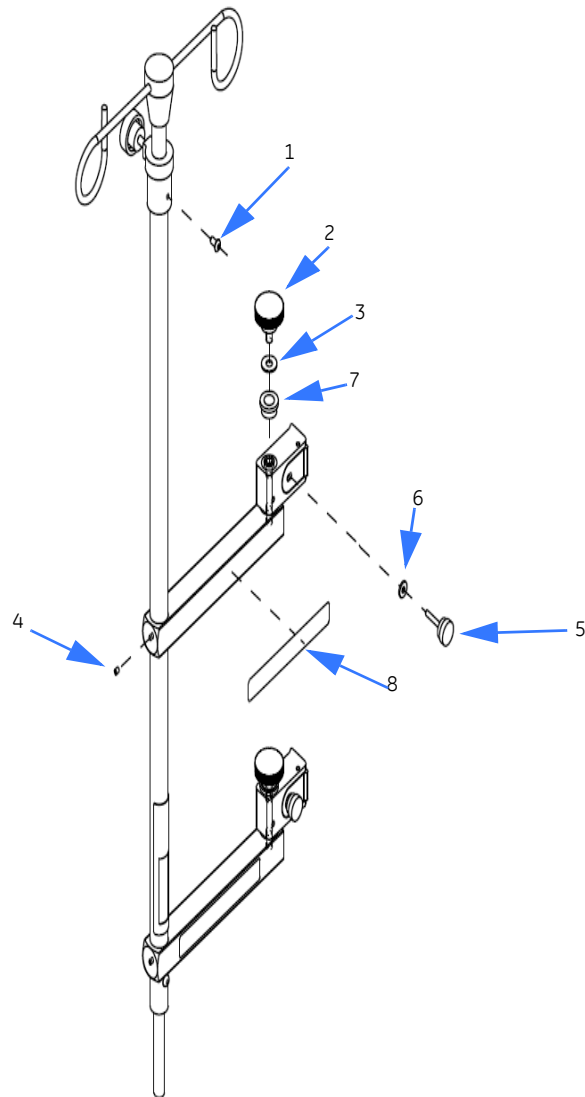


**FIGURE 8-36. Silo Support Assembly (6600-0853-800)**



- |                                |               |
|--------------------------------|---------------|
| 1. Screw, 10-32 Button Hd..... | 6600-1258-400 |
| 2. Knob.....                   | M1081553      |
| 3. Teflon washer.....          | 6600-1238-400 |
| 4. Set Screw M4 x 6.....       | 6600-0715-416 |
| 5. Knob, block.....            | 0217-5335-300 |
| 6. Washer.....                 | 0202-0095-300 |
| 7. Bushing.....                | 6700-0030-400 |
| 8. Label.....                  | 6600-2497-101 |

**Note:** If you need to replace the upper or lower swing arms, order the entire I.V. pole assembly.



**FIGURE 8-37. Rotating I.V. Pole Assembly (6600-0851-800)**

Options

- 1. Dovetail rail.....6600-1946-500
- 2. Bottom end cap.....6600-0366-500
- 3. Screw, 4-40 x 1/2, Skt. Hd.....0144-2117-208
- 4. Top end cap.....6600-1239-400
- 5. Swing arm assembly.....6600-1516-700
- 6. Knob.....6700-0020-400
- 7. Teflon washer.....6600-1238-400
- 8. Knob, block.....0217-5335-300
- 9. Washer.....0202-0095-300
- 10. Bushing.....6700-0030-400
- 11. Lock washer, int. tooth.....0202-3418-300
- 12. Screw, 5/16 - 18 Skt. Hd.....6600-0787-400
- 13. Label.....6600-2497-102
- 14. Pawl Block Assembly.....M1171925  
(Includes Items 8 and 9)

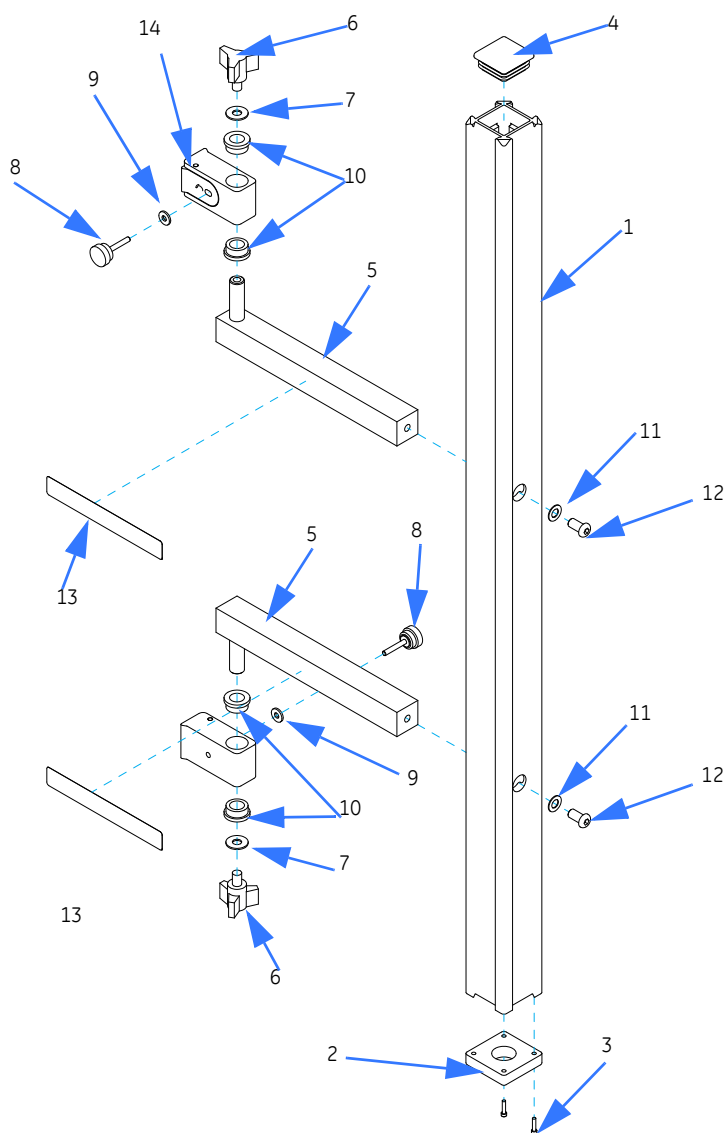


FIGURE 8-38. Dovetail Extension (6600-0852-800)

## 8.18 Options PNs

The following options are available for use with the device. Other options available for use with this device may be obtained through your sales representative.

Option	Part Number (where applicable)
Disposable patient probe (box of 10)	2074816-001
Disposable patient probe (box of 50)	2074817-001
Reusable patient probe	2075796-001
Heat reflecting patch (box of 50)	0203-1980-300
SENSORS O2 (2PK) SERVO2 GP - ROHS	2084419-001
Giraffe In-Bed Scales	Gravity Zone Specific PN
Corner trays SE & NW	6600-1793-500
Corner trays SW & NE	6600-1794-500
Air Filter Box of 10	6600-0207-850
Giraffe monitor shelf	6600-0824-800
Swivel instrument shelf (12 in x 12 in) 90°	6600-0865-700
Swivel instrument shelf (12 in x 12 in) 360°	6600-0513-801
High frequency vent porthole cover	6600-0838-800
Giraffe tubing management arm	6600-0837-800
Giraffe silo support	6600-0853-800
Patient restraint (pack of 5)	M1169540
Giraffe pressure diffusing mattress	2076066-001
Pressure Diffusing mattress cover sheet	6600-0688-800
Dovetail basket assembly	M1187887
Dovetail rail extension	6600-0852-800
Ventilator mounting pole	0217-5357-800
IV pump mounting post (20 in x 1 in)	0217-5376-800
Rotating and adjustable IV pole	6600-0851-800
IV pole dual hook 24 inch	6600-0491-801
IV pole dual hook 12 inch	0217-5378-800
Utility post (3.5 in x 1 in) dovetail	0217-5374-800
North end dovetail handle	M1159084
Cord wrap holders (2)	M1151830
Retaining clips (6)	6600-0055-851
Giraffe OmniBed Retrofit Kit for Enhanced Canopy Seals	M1208286
Giraffe OmniBed Hood Cover	6600-0825-800
GCX articulating arm with 7 inch channel monitor/display mount	6600-0894-214
Resuscitation bag and mask holder	6600-2150-500
Giraffe Easy-load E-cylinder holder	6600-0836-800

Options PNs

Option	Part Number (where applicable)
E-cylinder holder 2 sliding parts	M1151570
Cylinder holder XL International 2 sliding parts	M1151571
Giraffe Stand-Alone Resuscitation System T-Piece	Language Specific PN
Giraffe Stand-Alone Resuscitation System Bag & Mask	Language Specific PN
Giraffe Exam light	Language Specific PN
Giraffe Blue Spot PT Lite	Language Specific PN
BiliSoft Phototherapy System	Language Specific PN
Giraffe Shuttle	Language Specific PN

## 8.19 Labels

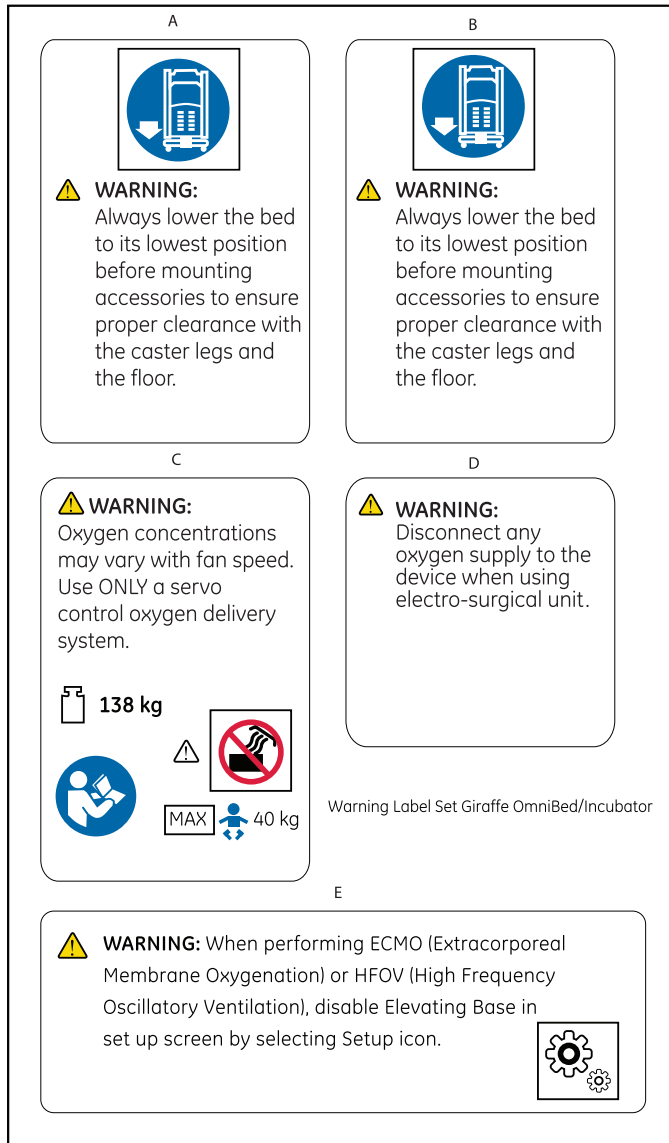
Part Number	Description	Language
2084425-001	LBL SET WARNINGS GIRAFFE ENG	ENGLISH
2078487-001	LBL SET WARNINGS GIRAFFE FRE	FRENCH
2078519-001	LBL SET WARNINGS GIRAFFE CANADA	CANADA
2078488-001	LBL SET WARNINGS GIRAFFE BUL	BULGARIAN
2078489-001	LBL SET WARNINGS GIRAFFE CHN	CHINESE
2078490-001	LBL SET WARNINGS GIRAFFE CRO	CROATIAN
2078491-001	LBL SET WARNINGS GIRAFFE CZ	CZECH
2078492-001	LBL SET WARNINGS GIRAFFE DAN	DANISH
2078493-001	LBL SET WARNINGS GIRAFFE DUTCH	DUTCH
2078494-001	LBL SET WARNINGS GIRAFFE ESTONIAN	ESTONIAN
2078495-001	LBL SET WARNINGS GIRAFFE FINNISH	FINNISH
2078496-001	LBL SET WARNINGS GIRAFFE GER	GERMAN
2078497-001	LBL SET WARNINGS GIRAFFE GREEK	GREEK
2078498-001	LBL SET WARNINGS GIRAFFE HUNGARIAN	HUNGARIAN
2078499-001	LBL SET WARNINGS GIRAFFE IND	INDONESIAN
2078500-001	LBL SET WARNINGS GIRAFFE ITA	ITALIAN
2078501-001	LBL SET WARNINGS GIRAFFE JAP	JAPANESE
2078502-001	LBL SET WARNINGS GIRAFFE KOR	KOREAN
2078503-001	LBL SET WARNINGS GIRAFFE LAT	LATVIAN
2078504-001	LBL SET WARNINGS GIRAFFE LITH	LITHUANIAN
2078505-001	LBL SET WARNINGS GIRAFFE NORWEGIAN	NORWEGIAN
2078506-001	LBL SET WARNINGS GIRAFFE POLISH	POLISH
2078507-001	LBL SET WARNINGS GIRAFFE PORTUGUESE	PORTUGUESE
2078508-001	LBL SET WARNINGS GIRAFFE BRAZIL PORT	BRAZILIAN PORTUGUESE
2078509-001	LBL SET WARNINGS GIRAFFE ROMANIAN	ROMANIAN
2078510-001	LBL SET WARNINGS GIRAFFE RUSSIAN	RUSSIAN
2078511-001	LBL SET WARNINGS GIRAFFE SERBIAN	SERBIAN
2078513-001	LBL SET WARNINGS GIRAFFE SLOVAK	SLOVAK
2078514-001	LBL SET WARNINGS GIRAFFE SLOVENIAN	SLOVENIAN
2078515-001	LBL SET WARNINGS GIRAFFE SPANISH	SPANISH
2078516-001	LBL SET WARNINGS GIRAFFE SWEDISH	SWEDISH
2078518-001	LBL SET WARNINGS GIRAFFE TURKISH	TURKISH
2075101-001	LBL PORT COVER	GENERIC
2082164-001	LBL BRANDING GIRAFFE	GENERIC

Labels

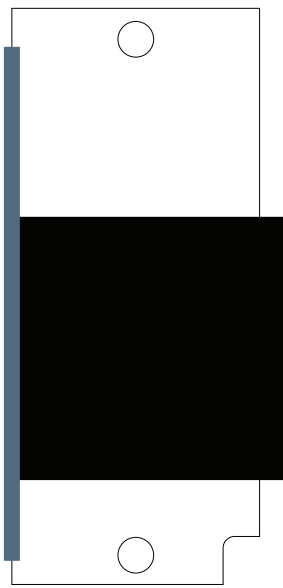
8.19.1 Label Illustrations

*Note:* Images shown are for reference only. Appearance of actual label may vary.

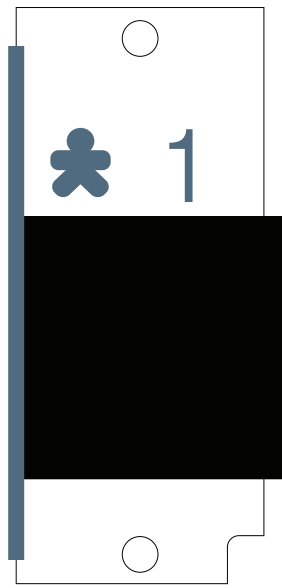
8.19.1.1 Warning Label Set



8.19.1.2 Connector Panel



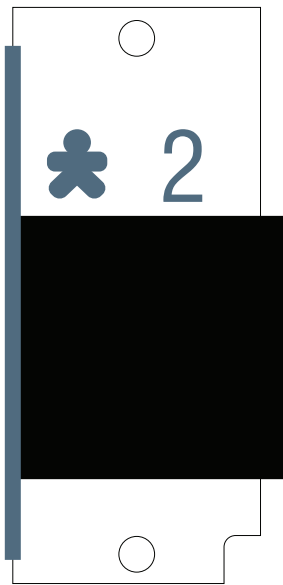
6600-2325-101



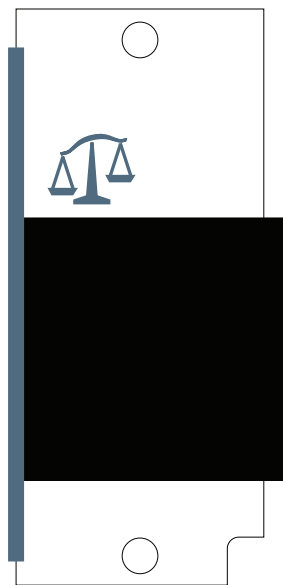
6600-2325-102



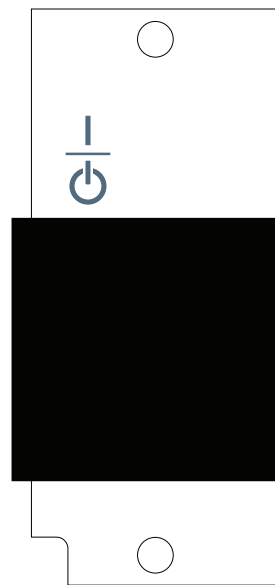
6600-2325-103



6600-2325-107



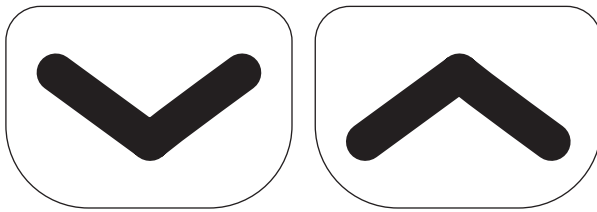
6600-2325-104



6600-2325-108

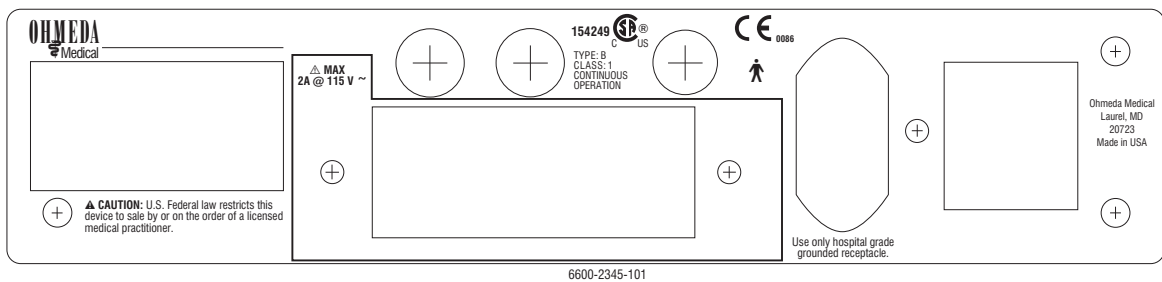
Labels

8.19.2 Raise/Lower Pedal



Raise/Lower Pedal switch label..... 6600-2552-101

8.19.3 Rating Label



Rating label 115V..... 6600-2345-101  
Rating label 220V..... 6600-2345-102  
Rating label 100V..... 6600-2345-103

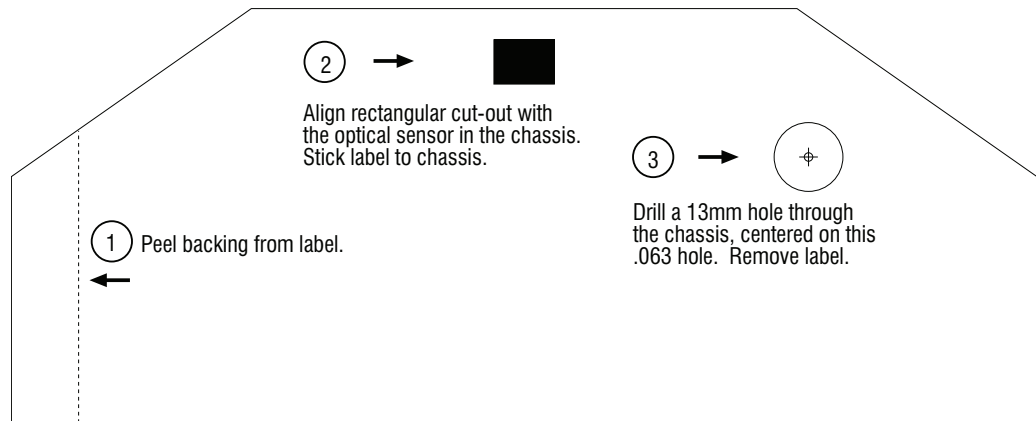
8.19.4 Porthole Warning



Porthole warning label..... 6600-2658-101

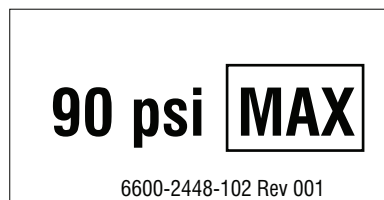
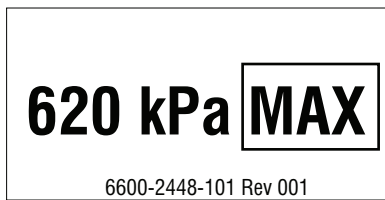


8.19.5 Chassis Vent Servo O2



Chassis vent Servo O2 template label ..... 6600-2488-100

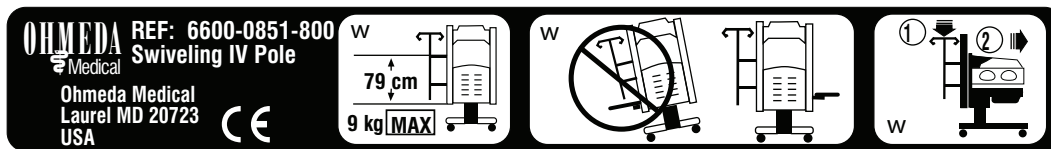
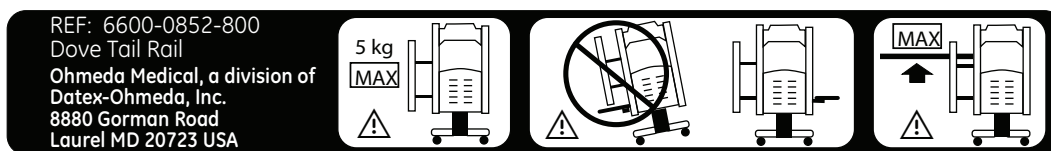
8.19.5.1 Servo O2 Maximum Pressure Labels



kPa ..... 6600-2448-101  
psi ..... 6600-2448-102

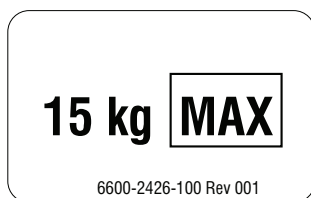
Labels

8.19.5.2 Weight Limit Warnings



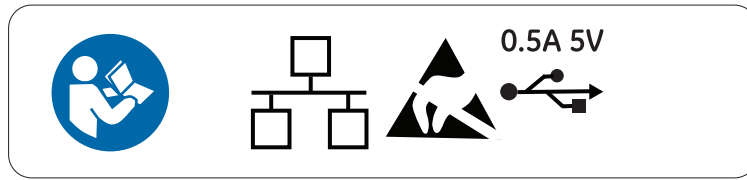
最大  
22 千克

IV Pole.....6600-2497-101  
Dovetail Rail.....6600-2497-102



15kg Max load DIN rail label.....6600-2426-100

8.19.5.3 Port Cover



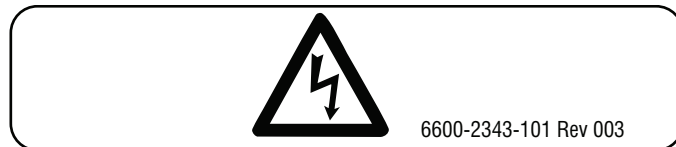
8.19.5.4 Branding Label



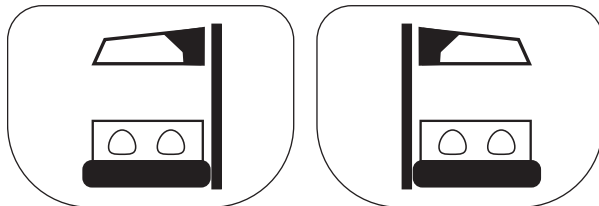
8.19.6 Other Warnings



6600-2328-101  
Rev A



8.19.7 Canopy



Canopy Pedal switch label ..... 6600-2552-102

### 8.20 PCB Layouts

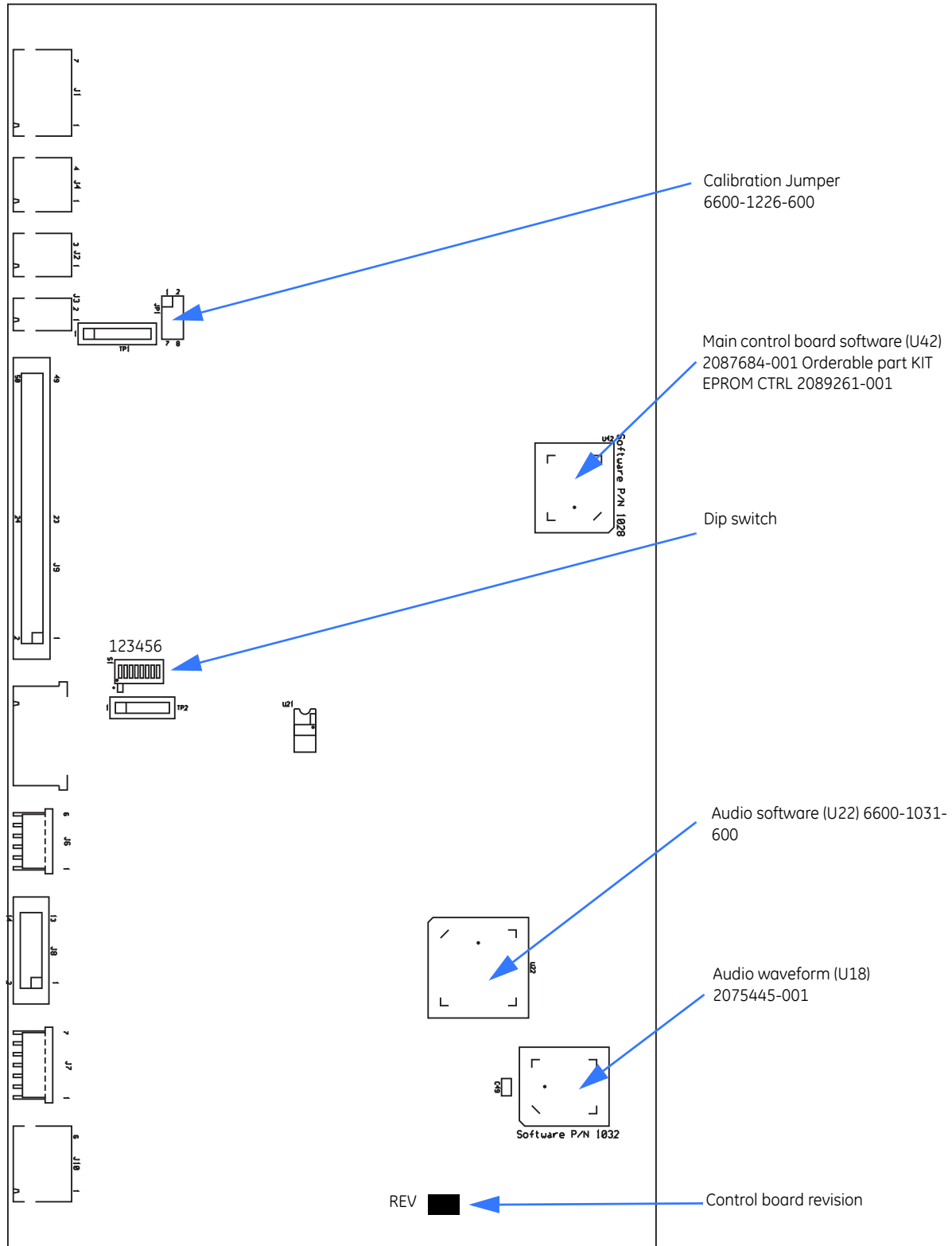


FIGURE 8-39. Control Board (2080962-001)

2089821-001 Clock Battery (CR2032, 3V, LITHIUM)

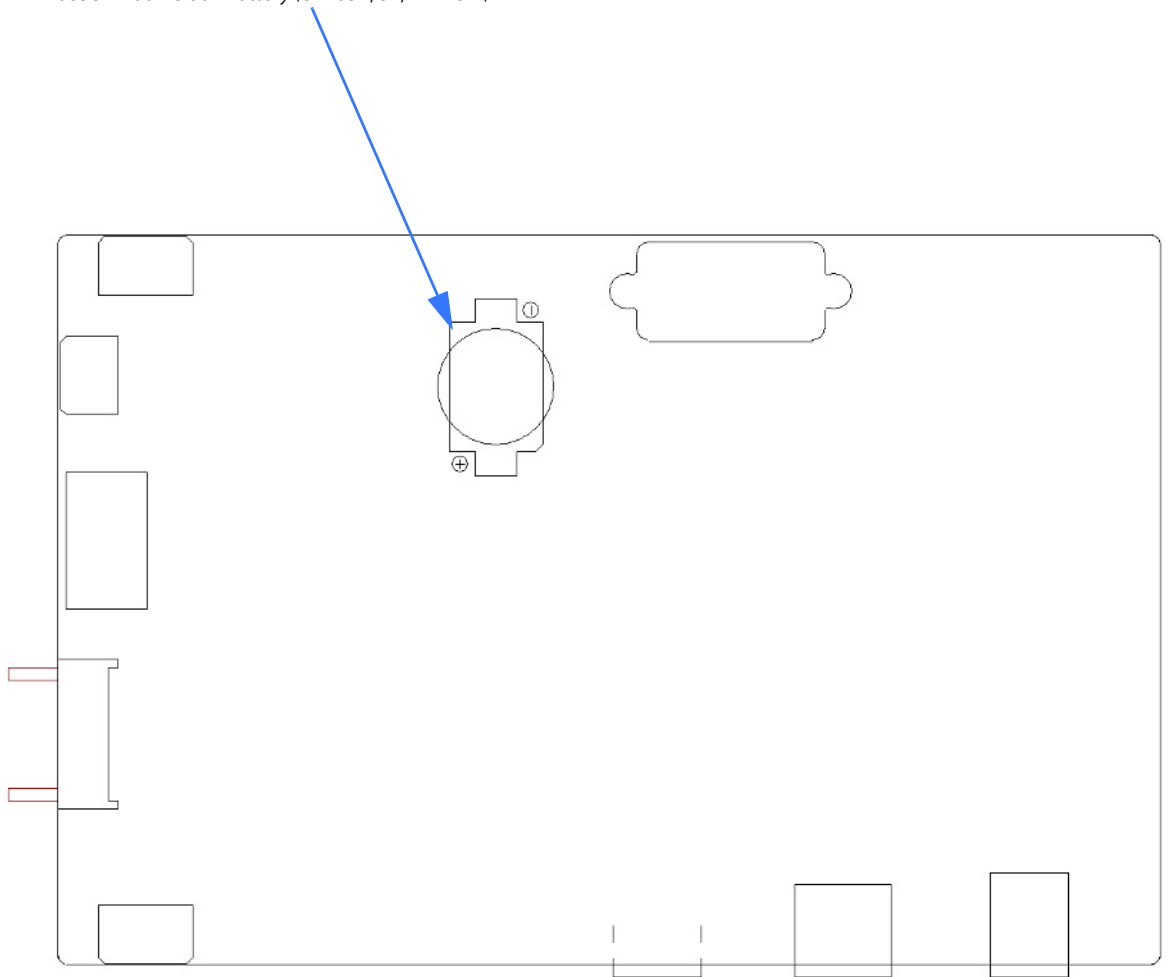


FIGURE 8-40. SBC (2074306-001)

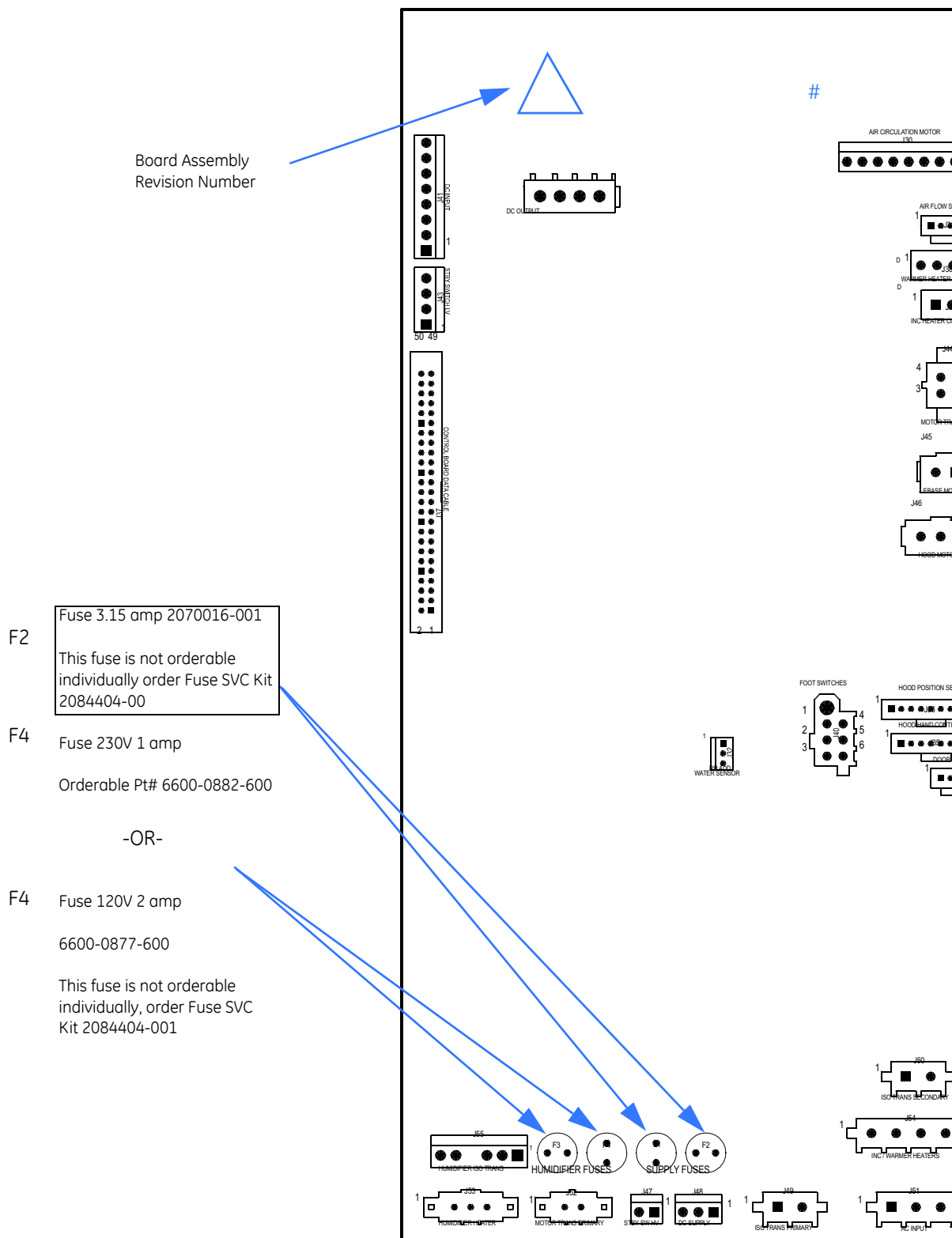


FIGURE 8-41. Relay Board (Service Kit: 2080429-001)

### 8.21 Wiring Diagrams

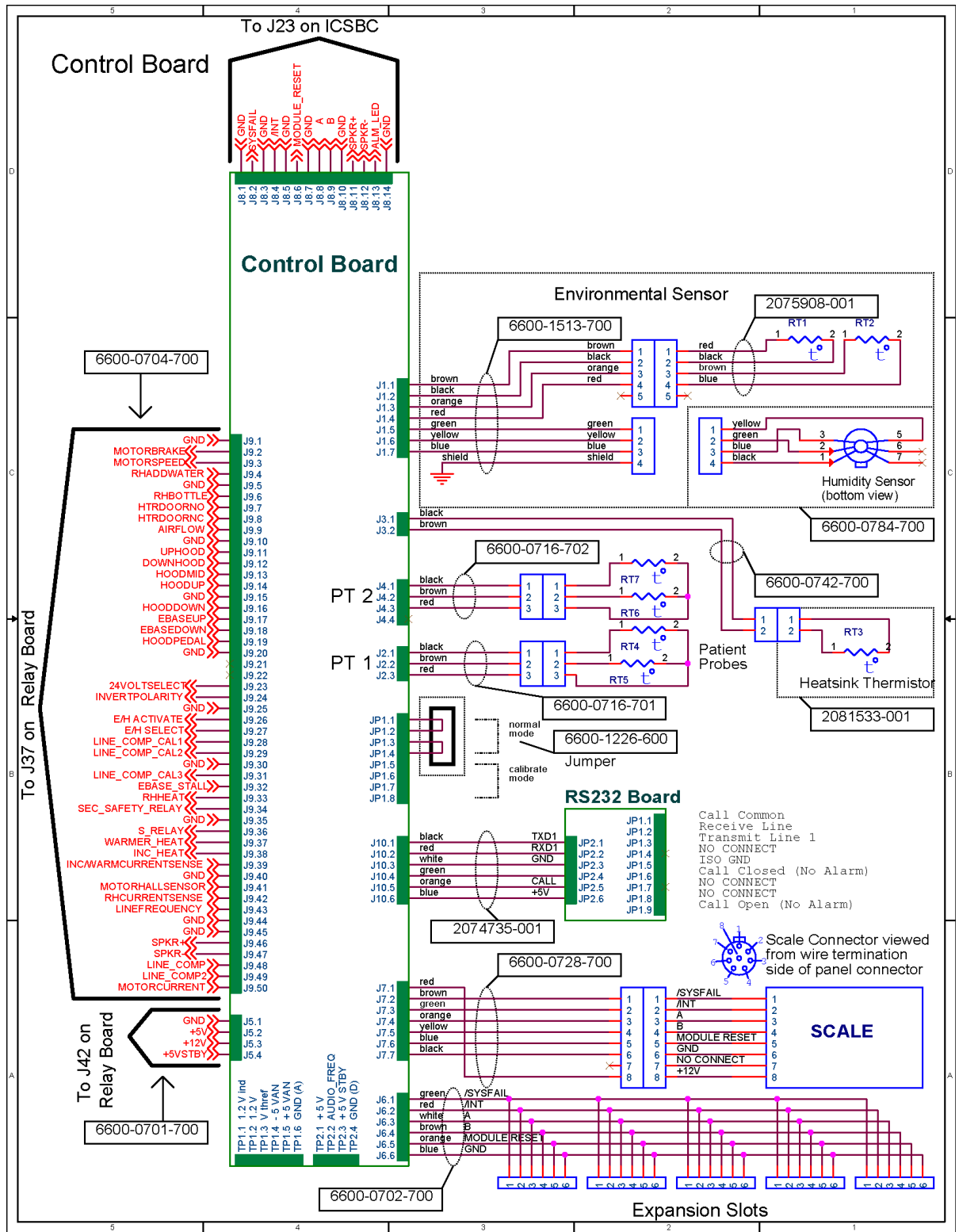


FIGURE 8-42. Wiring Diagram: Control Board

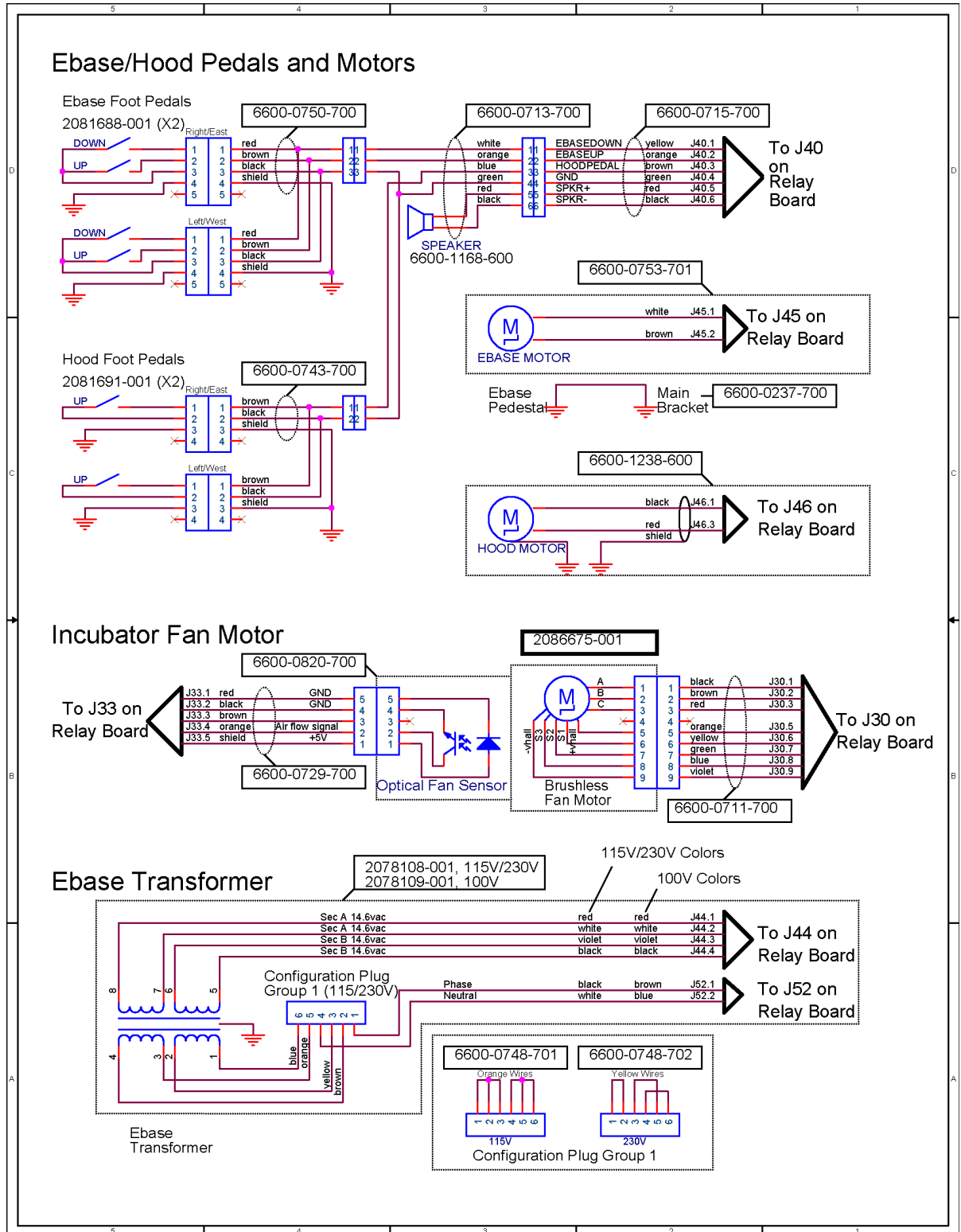


FIGURE 8-43. Wiring Diagram: Elevating Base, Hood, and Motors



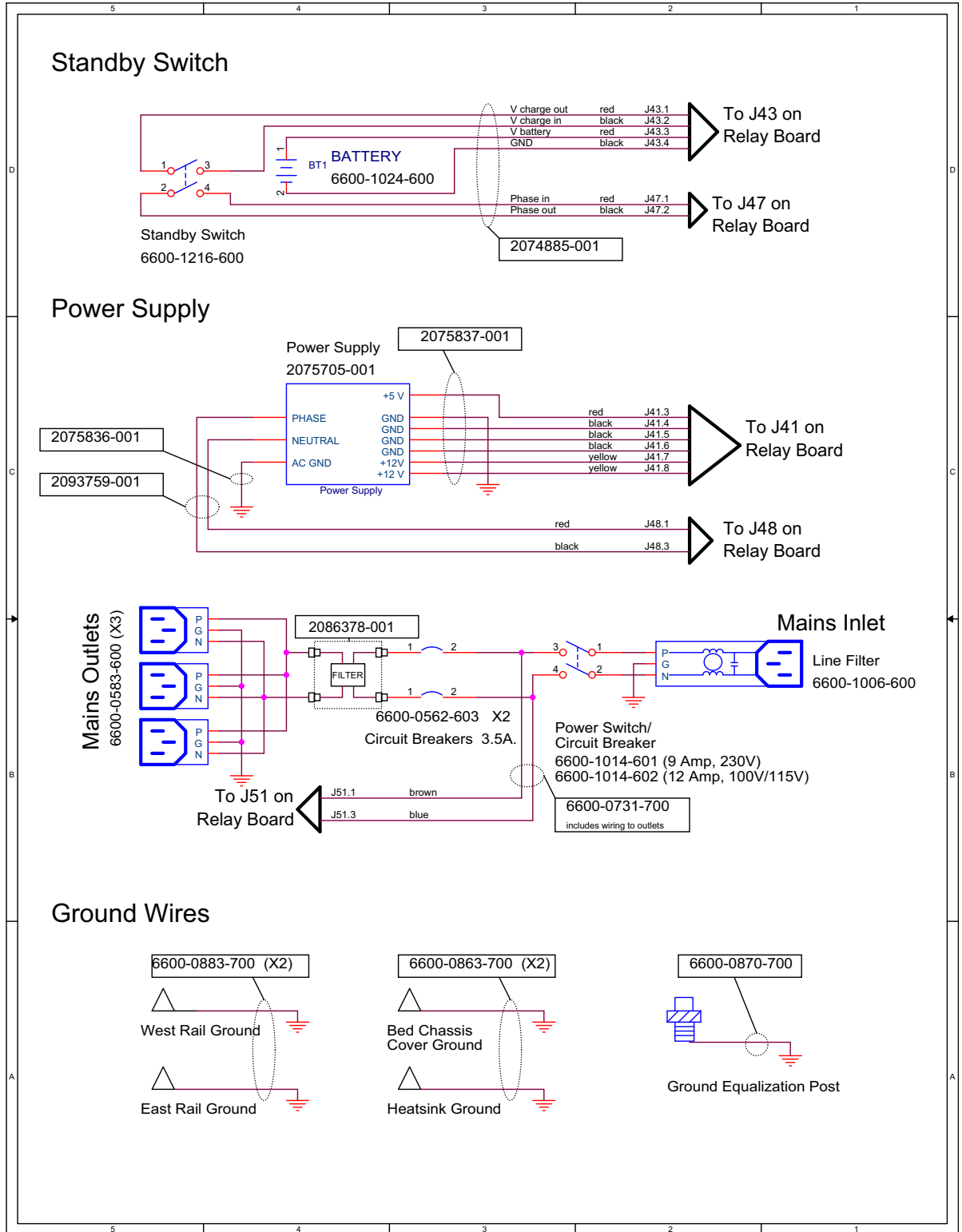


FIGURE 8-44. Wiring Diagram: Electrical Enclosure

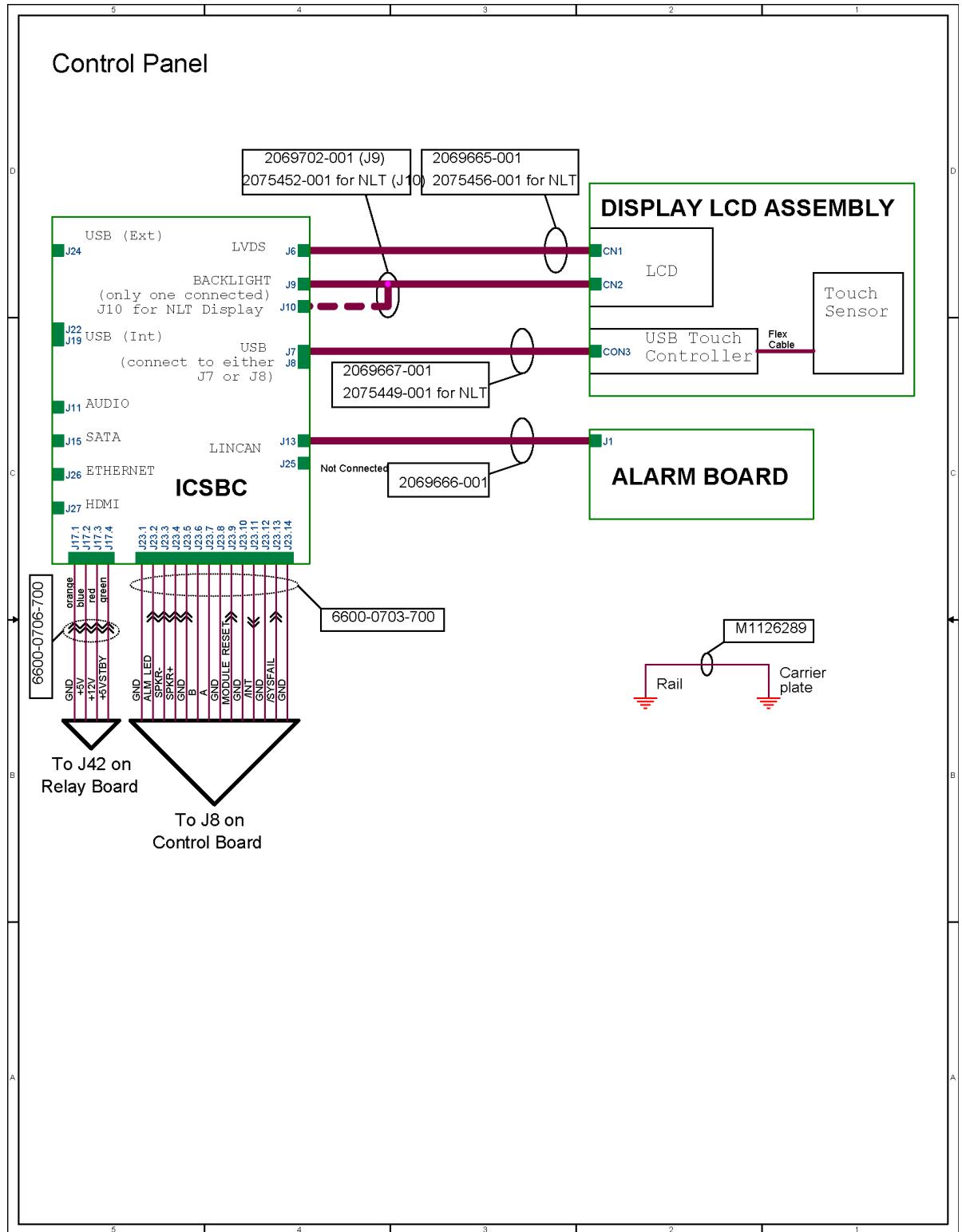


FIGURE 8-45. Wiring Diagram: Control Panel

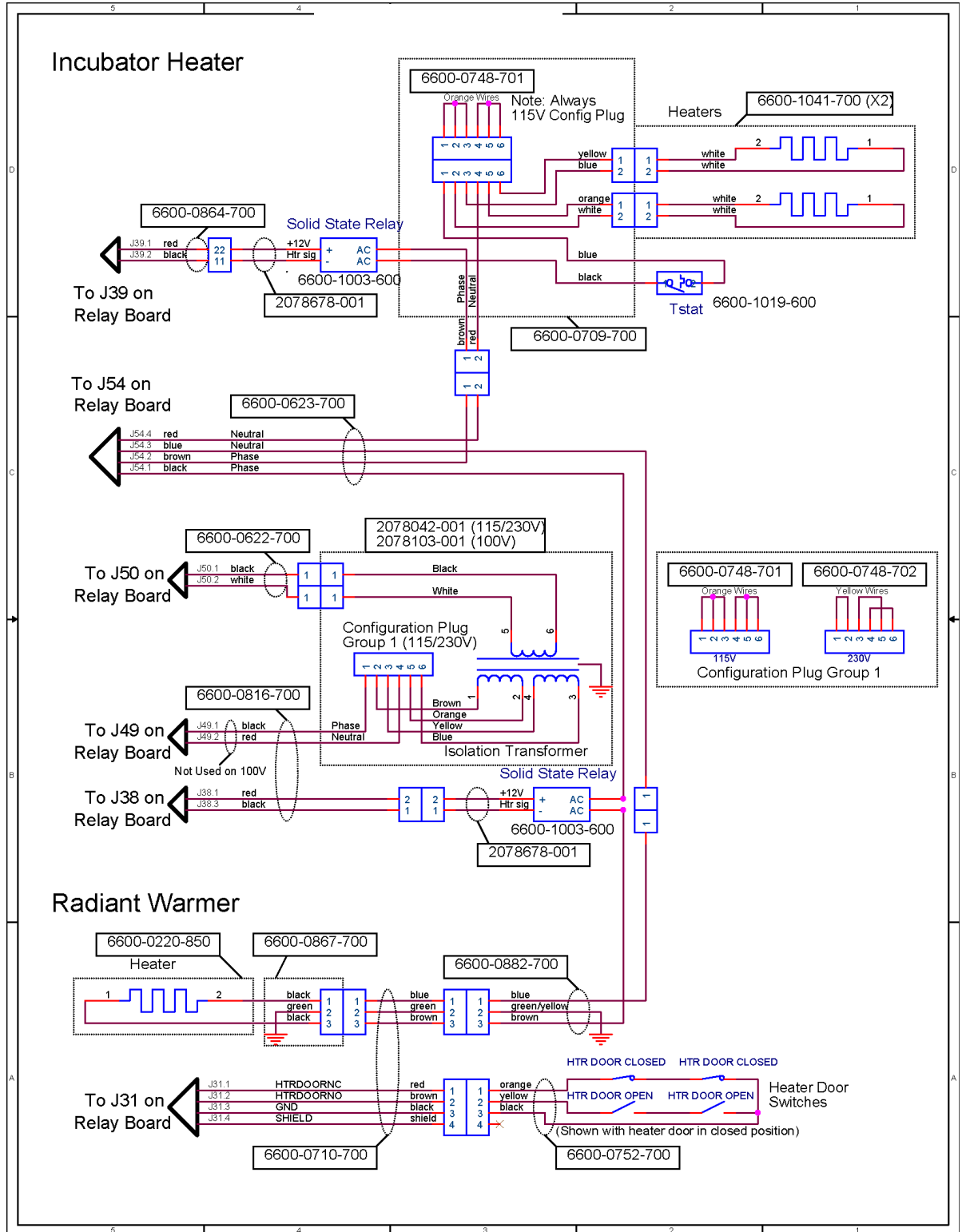


FIGURE 8-46. Wiring Diagram: Incubator and Warmer Heater

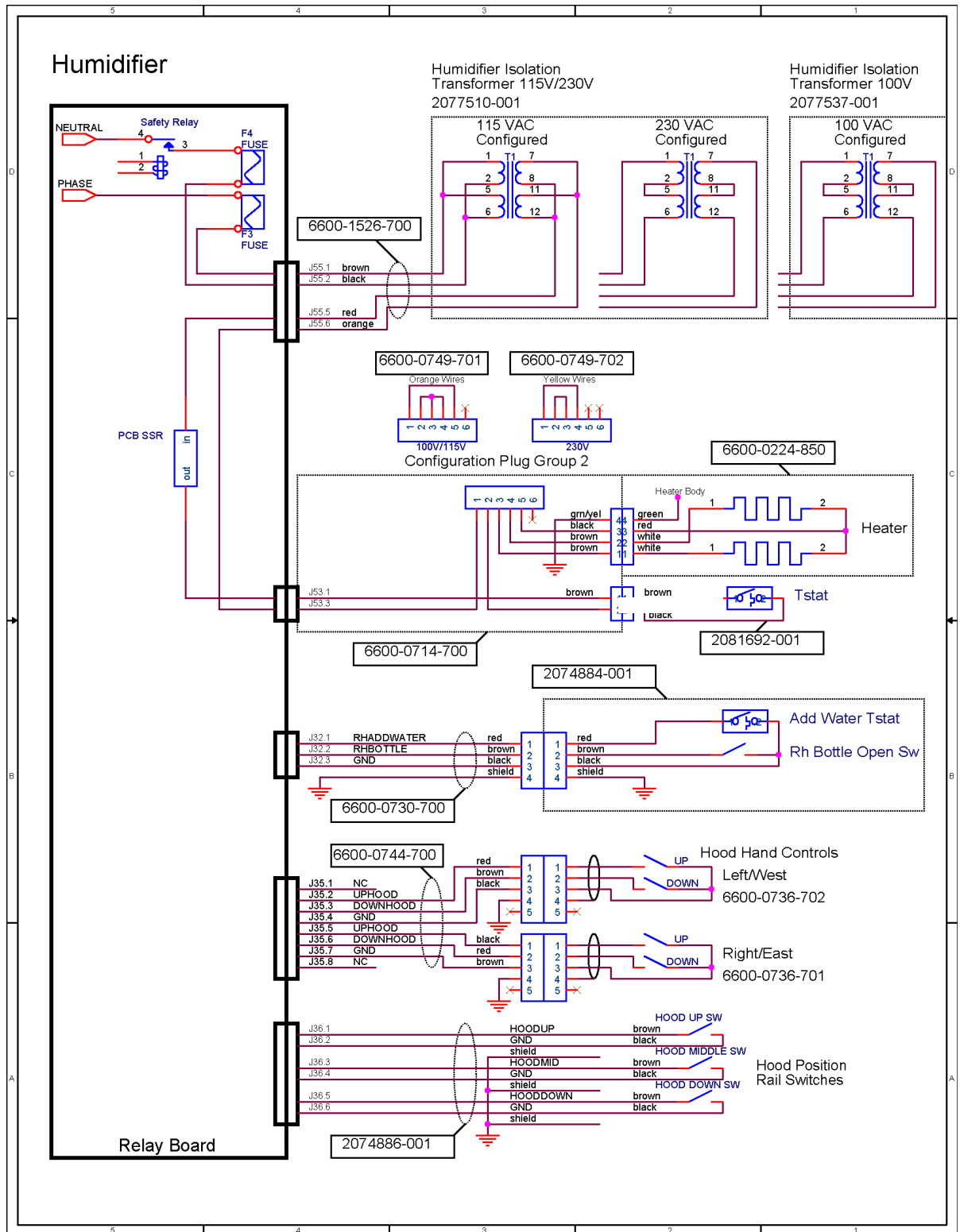


FIGURE 8-47. Wiring Diagram: Servo Humidifier

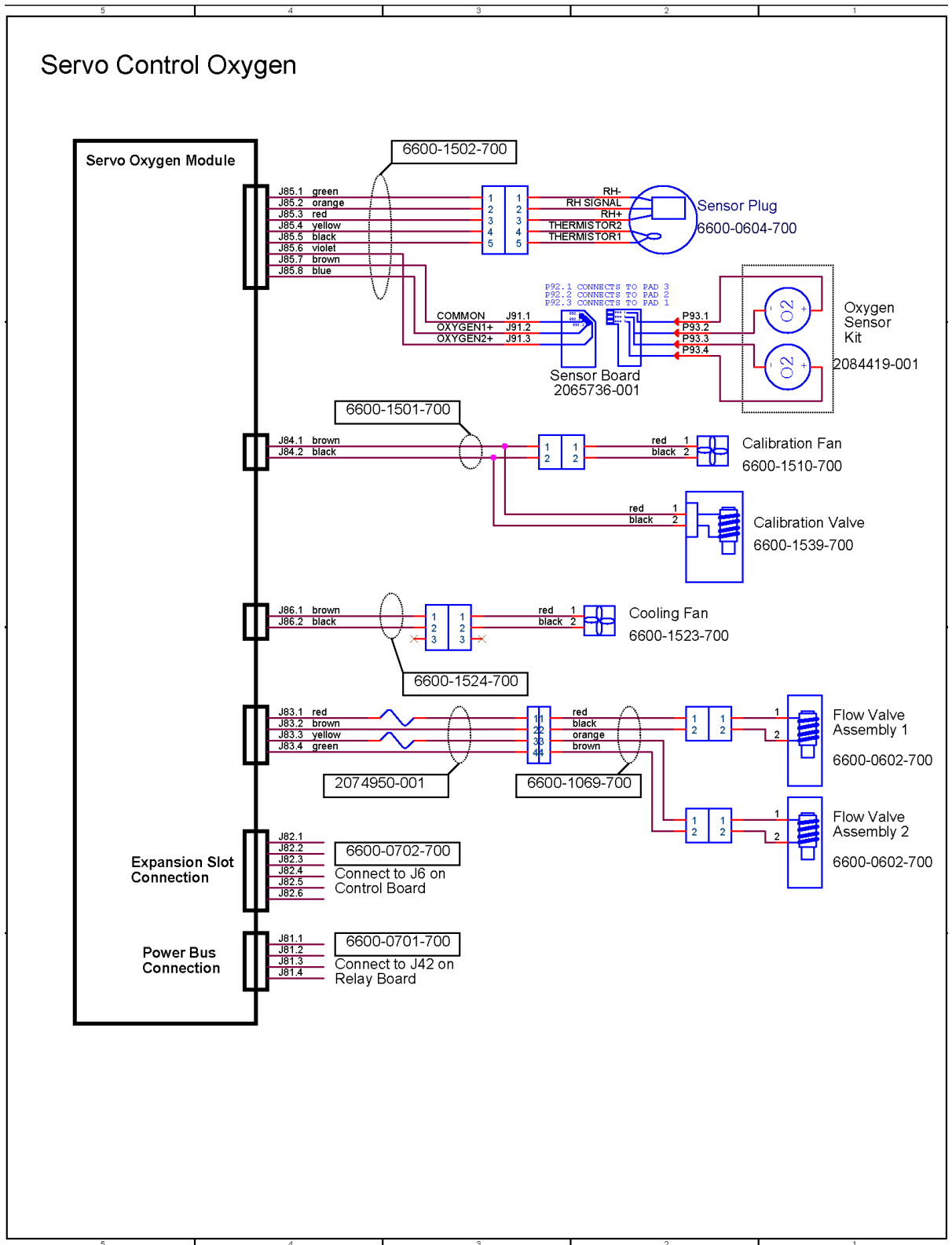


FIGURE 8-48. Wiring Diagram: Servo Control Oxygen



# Appendix A: Compartment and Skin Probe Characteristics

Temp °C	Res. Ohms
29.9	8071.2
30.0	8036
30.1	8002.0
30.2	7967.6
30.3	7933.4
30.4	7899.4
30.5	7865.6
30.6	7831.9
30.7	7798.3
30.8	7765.0
30.9	7731.7
31.0	7698.7
31.1	7665.8
31.2	7633.1
31.3	7600.5
31.4	7568.1
31.5	7535.9
31.6	7503.8
31.7	7471.8
31.8	7440.0
31.9	7408.4
32.0	7376.9
32.1	7345.6
32.2	7314.4
32.3	7283.4
32.4	7252.5
32.5	7221.8
32.6	7191.2
32.7	7160.8
32.8	7130.5
32.9	7100.4
33.0	7070.4
33.1	7040.5
33.2	7010.8
33.3	6981.3
33.4	6951.8
33.5	6922.6
33.6	6893.4
33.7	6864.4
33.8	6835.5
33.9	6806.8

Temp °C	Res. Ohms
34.0	6778.2
34.1	6749.8
34.2	6721.5
34.3	6693.3
34.4	6665.3
34.5	6637.3
34.6	6609.6
34.7	6581.9
34.8	6554.4
34.9	6527.0
35.0	6499.8
35.1	6472.6
35.2	6445.7
35.3	6418.8
35.4	6392.1
35.5	6365.4
35.6	6339.0
35.7	6312.6
35.8	6286.4
35.9	6260.3
36.0	6234.3
36.1	6208.4
36.2	6182.7
36.3	6157.0
36.4	6131.5
36.5	6106.2
36.6	6080.9
36.7	6055.8
36.8	6030.7
36.9	6005.8
37.0	5981.1
37.1	5956.4
37.2	5931.8
37.3	5907.4
37.4	5883.1
37.5	5858.9
37.6	5834.8
37.7	5810.8
37.8	5786.9
37.9	5763.1
38.0	5739.5

Temp °C	Res. Ohms
38.1	5716.0
38.2	5692.5
38.3	5669.2
38.4	5646.0
38.5	5622.9
38.6	5599.9
38.7	5577.0
38.8	5554.3
38.9	5531.6
39.0	5509.0
39.1	5486.6
39.2	5464.2
39.3	5441.9
39.4	5419.8
39.5	5397.7
39.6	5375.8
39.7	5354.0
39.8	5332.2
39.9	5310.6
40.0	5289.0
40.1	5267.6
40.2	5246.2
40.3	5225.0
40.4	5203.9
40.5	5182.8
40.6	5161.9
40.7	5141.0
40.8	5120.2
40.9	5099.6
41.0	5079.0
41.1	5058.5
41.2	5038.2
41.3	5017.9
41.4	4997.7
41.5	4977.6
41.6	4957.6
41.7	4937.7
41.8	4917.9
41.9	4898.1
42.0	4878.5
42.1	4858.9

Temp °C	Res. Ohms
42.2	4839.5
42.3	4820.1
42.4	4800.8
42.5	4781.6
42.6	4762.5
42.7	4743.5
42.8	4724.5
42.9	4705.7
43.0	4686.9
43.1	4668.3
43.2	4649.7
43.3	4631.2
43.4	4612.7
43.5	4594.4
43.6	4576.1
43.7	4558.0
43.8	4539.9
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44.0	4503.9
44.1	4486.1
44.2	4468.3
44.3	4450.6
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44.6	4398.1
44.7	4380.7
44.8	4363.4
44.9	4346.2
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# Appendix B: Specifications

## Power Requirements

11.5 A @ 100V ~, 50/60 Hz	2 A @ 100V ~, 50/60 Hz (Accessory Outlet)
9.5 A @ 115V ~, 50/60 Hz	2 A @ 115V ~, 50/60 Hz (Accessory Outlet)
5.5 A @ 220V ~, 50/60 Hz	1 A @ 220V ~, 50/60 Hz (Accessory Outlet)
5.5 A @ 230V ~, 50/60 Hz	1 A @ 230V ~, 50/60 Hz (Accessory Outlet)
5.5 A @ 240V ~, 50/60 Hz	1 A @ 240V ~, 50/60 Hz (Accessory Outlet)

Inrush for 1/2 cycle current < 80 A

## Electrical

Operation	Continuous
Device Type	Class 1
Applied Part	Type B

## Operating Environment

Temperature	20 - 30°C
Humidity	5 - 85% Non-condensing relative humidity
Altitude	Up to 10,000 ft (3,048m, 696 hPa)
Air Velocity	Up to 0.3 m/s
Water Ingress	IPX0
Use Environment	Equipment not suitable for use in the presence of a flammable anesthetic mixture.

## Storage Conditions

Temperature	-25 to 60°C
Humidity	≤ 85% Non-condensing relative humidity (above 0°C)
Pressure	50 - 106 kPa

## User Control Settings

Patient Control Temperature	35 - 37.5°C in 0.1°C increments
Radiant Heat Power	0 - 100% in 5% increments
Air Control Temperature	20 - 39°C in 0.1°C increments
Humidity	30 - 95% RH in 5% increments

## Cleaning

Cold Chemical Disinfectant  
Sterilization Not Required

## Defibrillation Proof

Applied Parts Area Not Defibrillation Proof

## Signal Input/Output

RS-232 Serial Data

**Installation**

Non-Permanent Installation of Equipment

**System Performance**

Expected Service Life	Approximately 7 years. The device is designed to last at least 7 years in normal use when operated, maintained, and serviced in accordance with the instructions provided in the provided manuals. With proper maintenance and repairs, the service life can be extended as long as service parts are available.	
Patient Temperature Measurement Accuracy*	± 0.3°C @ 30°C to 42°C	Accuracy of patient temperature measurement system within range of temperature measurement.
Temperature Control Accuracy*	± 1.0°C	Control temperature vs average incubator temperature with level bed in Manual Mode.
Variability	± 0.5°C	Incubator temperature vs average incubator temperature.
Warm-up Time	< 50 min.  Unit with low noise fan: < 30 min.	Time to reach 39°C control temp from cold start in 25°C 50% RH room ambient.  Measured in accordance with IEC 60601-2-19.
Air Velocity	≤ 10 cm/s	In Whisper Quiet™ mode velocity measured 10 cm above the center of the mattress, closed bed.
CO <sub>2</sub> Level	0.3%	Maximum CO <sub>2</sub> level measured per IEC 60601-2-19.
Sound Level (within patient compartment)	Unit with low noise fan: ≤ 41 dBA Unit without low noise fan: < 50 dBA	In Whisper Quiet™ mode closed bed sound level measured 10 cm above the center of the mattress.
Sound Level for Alarms	63 dBA (High Priority) 60 dBA (Medium Priority)	Sound pressure level is measured in a free field over a reflecting plane in accordance with IEC 60601-1-8.
USB Port Output	0.5 A, 5 VDC	

**Note:** The above items noted with an asterisk (\*) indicate essential performance.

**Patient Contact Surfaces**

Mattress

Skin Temperature Probe

### Irradiance

During the ten minute warm up period, the radiant heater is at 100% power (~27 mW/cm<sup>2</sup>). After the radiant heater has been running in warm up mode for ten minutes, the heater power setting drops to 25% (less than 10 mW/cm<sup>2</sup>).

**Note:** The 25% setting can be changed in Service Mode.

### Weight Scale Performance

Functional Range	300g - 8 kg
Accuracy	± 10g
Resolution	10g (Factory setting) or 5g (user selectable on non-EU scales) The resolution of scales distributed in the EU region vary depending on the scale revision: <ul style="list-style-type: none"> <li>• Scales with revision 2.72 only have a resolution option of 10g.</li> <li>• Scales with revision 2.86 have a resolution of 5g for weights up to 5 kg and a resolution 10g for weights from 5 kg to 8 kg.</li> <li>• The resolution on EU scales with software 2.86 and above is not user selectable.</li> </ul>

**Note:** For the European Union (EU) and the European Free Trade Association (EFTA) member states in Europe, check with your local regulations with respect to the Non-Automated Weighing Instrument (NAWI) directive as to the process and frequency for scale calibration. The resolution of scales distributed in this EU region only have a resolution option of 10g.

### Servo Oxygen

The time from turning on the servo control oxygen system until the system is fully operational is less than 10 seconds.

Control Range	21% - 65%
Resolution	1%
Accuracy*	5% (< 0.02% drift over 24 hours)
Rise Time	≤ 10 minutes from 21% to 5% below set point (in Whisper Quiet™ mode)
Recovery from Opening Porthole	≤ 5 minutes from closing porthole to 5% below set point (in Whisper Quiet™ mode)
Inlet Pressure	310 kPa (45 psi) - 620 kPa (90 psi) Effects of Barometric Pressure: The Servo O2 system is not equipped with automatic barometric pressure compensation. Between Servo O2 system calibrations, a 1 kPa barometric pressure increase will increase the oxygen concentration reading by 0.2% O <sub>2</sub> .

**Note:** The above item noted with an asterisk (\*) indicates essential performance.

**Humidity**

Servo Control Accuracy*	± 10% for settings up to 85%; minimum 75% for settings > 85%	Humidity control setting vs average humidity at 10 cm above center of bed.
Ramp-up Time	≤ 50 minutes	Time to reach 75% RH with a 39°C control temp from cold start in 25°C, 50% RH room.
<b>Note:</b> The above item noted with an asterisk (*) indicates essential performance.		
Operating Time without Refill	> 12 hours	Operational time at 65% RH control setting with one filling of reservoir in 25°C, 50% RH room.

**Mechanical**

Height	Canopy closed, bed lowered 152 cm Canopy closed, bed raised 178 cm Canopy open, bed lowered 209 cm Canopy open, bed raised 239 cm
Width	66 cm
Depth	114 cm
Weight	149 kg
Mattress Size	48.8 cm X 64.8 cm
Bed Tilt	± 12 degrees continuous tilt
The Maximum Patient Weight	40 kg (88 lbs)

**Option Load Limits**

Storage Drawer Package	7 kg
Instrument Shelf	9 kg
Monitor Shelf	22 kg
Rotating I.V. Pole	9 kg
Total Each Mounting Rail	22 kg

**Uninterruptable Power Supply (UPS) (Not available with 230V devices)**

For UPS specifications, refer to the Addendum: UPS for Giraffe and Panda Products (provided with the UPS).

# Appendix C: RS-232 Serial Data



**Warning:** The computer or RS-232 monitor's user program must continuously check the data link. The program should constantly verify connection to the control panel and check for updated data.

**Note:** In the event of a power failure, all serial communication will cease until power is restored.

## C.1 RS-232 Connector

The Nurse Call and the serial data output share the same female, nine pin, d-type connector.

- Pin 2: Receive Data (incubator input)
- Pin 3: Transmit Data (incubator output)
- Pin 5: Gnd (Signal Ground)

### C.1.1 Cable Requirements

The user interface cable must have capacitance less than 1500 pF. It should be a shielded cable such as Belden 9611 with AMP shielding kit 748046-1 and ferrule 747579-8.

## C.2 Data Stream

The data stream from the Giraffe products is repeated every two seconds. The RS-232 parameters are 19200 bps baud rate, no parity, 8 data bits, and one stop bit. The data is in ASCII format; the string is described below:

```
HYB_1.40,36.1,OPEN,28.3,33.0,36.5,100,N,N,C,00,063,D,L,02043,0000,00,43,000,000,03,00
```

HYB	This is the product code. <ul style="list-style-type: none"><li>• <b>HYB</b> represents an OmniBed.</li><li>• <b>INC</b> represents an incubator.</li></ul>
1.40	This is the control board software revision (thermoregulation in the startup screen).
36.1	Temperature from Patient Probe #1.
OPEN	Temperature from Patient Probe #2. <b>OPEN</b> represents no probe connected.
28.3	Air display temperature from the compartment probe.
33.0	Desired Environmental Temperature (DET). In Air Mode, this is also the air control temperature.
36.5	Patient control temperature.
100	Heater power.
N	Patient mode. This is either <b>P</b> or <b>N</b> .
N	Open bed mode. This is either <b>O</b> or <b>N</b> .

## Nurse Call

C	Closed bed mode. This is either <b>C</b> or <b>N</b> .
00	Set point for humidity. The <b>00</b> means the humidifier is not on.
063	Relative humidity in the patient compartment as measured by the compartment probe.
D	Air Boost Status. This is a flag describing the status of the Air boost button. <ul style="list-style-type: none"> <li>• <b>D</b> means that the Air Boost feature is off.</li> <li>• <b>A</b> means that the Air Boost feature is on.</li> <li>• <b>L</b> means that the user forced the feature off.</li> </ul>
L	Fan speed. This is either <b>L</b> or <b>H</b> .
02043	Heat sink sensor resistance. The resistance-temperature curve is located in the Tips section of the Troubleshooting chapter.
0000	Last scale weight in grams. The zeros mean that no weight was taken in this patient session.
00	Oxygen set point.
43	Oxygen measurement. If both oxygen set point and oxygen measurement are 0, the GSOCS module is not installed.
000	SpO2 measurement.
000	Pulse rate measurement.
03	Alarms. This is the alarm code 03. If there are multiple alarms, then all of the codes will be listed here.
00	The string ends with <b>00</b> .

### C.3 Nurse Call

#### C.3.1 Contact Ratings

- Maximum resistive load: 6 VA
- Maximum DC switching voltage: 24 VDC
- Maximum switching current: 0.25 A
- Maximum carrying current: 0.50 A

#### C.3.2 Connector

The Nurse Call contacts and the serial data output share the same female, nine pin, d-type connector.

Pin 6:	Closed contact under normal conditions, i.e., power on, no alarm (recommended configuration).
Pin 1:	Common contact.
Pin 9:	Open contact under normal conditions, power on, no alarm. These contacts are not powered. They only provide closure.

### C.3.3 Nurse Call Signals

Incubator Status	Nurse Call Signal	
	Pins 1 and 6	Pins 1 and 9
Normal	Closed	Open
Alarm	Open	Closed
Pwr switch off or pwr fails	Open	Closed
Nurse Call cable disconnected	Open	Open

Nurse Call



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